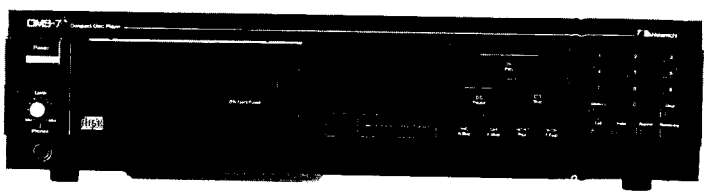
Nakamichi

Service Manual

Nakamichi

OMS-7
OMS-7E
OMS-70

Compact Disc Player



CONTENTS

1. General . . . 2
2. Pickup Replacement Procedures . . . 2
   2. 1. Notice in Handling Pickup . . . 2
   2. 2. Pickup Replacement Procedures . . . 2
   2. 3. Adjustment After Replacement of Pickup . . . 2
3. Measurement Instruments and Test Discs . . . 3
4. Parts Location for Adjustment . . . 4
   4. 1. Parts on P.C.B. Ass'y . . . 4
   4. 2. Parts on Pickup . . . 4
5. Adjustments . . . 4
   5. 1. Notes . . . 5
   5. 2. Adjustment Instructions . . . 5
6. Mechanism Ass'y and Parts List . . . 5
   6. 1. Synthesis . . . 10
   6. 2. Front Panel Ass'y (A01) . . . 10
   6. 3. Chassis Ass'y (A02) . . . 11
   6. 4. Disc Mechanism Ass'y (B01) . . . 12
   6. 5. Rear Panel Ass'y (B02) . . . 13
   6. 6. Disc Mechanism Sub Ass'y (C01) . . . 15
   6. 7. Analog Processor Unit (D01) . . . 15
7. Mounting Diagrams and Parts List . . . 16
   7. 1. Photo Transistor P.C.B. Ass'y . . . 17
   7. 2. Photo Diode P.C.B. Ass'y . . . 17
   7. 3. Open End Switch P.C.B. Ass'y . . . 17
   7. 4. Close End Switch P.C.B. Ass'y . . . 17
   7. 5. Eject/Load Switch P.C.B. Ass'y . . . 17
   7. 6. Power Switch P.C.B. Ass'y . . . 17
   7. 7. Volume P.C.B. Ass'y . . . 17
   7. 8. Remote Control P.C.B. Ass'y . . . 17
   7. 9. Pin Jack P.C.B. Ass'y . . . 17
   7. 10. FL Indicator P.C.B. Ass'y . . . 18
   7. 11. Headphone Amp. P.C.B. Ass'y . . . 18
   7. 12. Auto Power Control P.C.B. Ass'y . . . 19
   7. 13. RF Pre-Amp. P.C.B. Ass'y . . . 19
   7. 14. Power Supply P.C.B. Ass'y . . . 20
   7. 15. Control Switch P.C.B. Ass'y . . . 21
   7. 16. Analog Processor P.C.B. Ass'y . . . 22
   7. 17. D/A Converter P.C.B. Ass'y . . . 22
   7. 18. Main P.C.B. Ass'y . . . 23
8. Schematic Diagram . . . 26
   8. 1. IC Block Diagrams and Descriptions . . . 27
   8. 2. Waveforms at Major Points . . . 27
   8. 3. Schematic Diagram . . . 37
9. Wiring Diagram . . . 38
10. Block Diagram . . . 39
11. Remote Control Transmitter Unit RM-7 . . . 39
   11. 1. Mechanism Ass'y and Parts List . . . 40
   11. 2. Mounting Diagram and Parts List . . . 40
   11. 3. Schematic Diagram . . . 41
12. Specifications . . . 41

1. GENERAL

1.1. Voltage Selector

Voltage selector is installed on the rear panel for Other version of the Nakamichi OMS-7. This voltage selector can select either 120 V or 220-240 V at customer's disposal.

1.2. Packing Materials and Owner's Manual

Part No.	Description	Q'ty
0C81046A	Outer Carton OMS-7	1
0C81081A	Outer Carton OMS-7E	1
0C81082A	Outer Carton OMS-70 (Japan)	1
0C81047A	Inner Carton OMS-7	1
0C81085A	Inner Carton OMS-7E	1
0C81086A	Inner Carton OMS-70 (Japan)	1
0C81051A	Side Packing L	1
0C81050A	Side Packing R	1
0C81052A	Mirror Mat Bag	1
0D04491A	Owner's Manual OMS-7 & OMS-5 (English)	1
0D04493A	Owner's Manual OMS-7/7E & OMS-5/5E (English/German/French)	1
0D04492A	Owner's Manual OMS-70/50 (Japanese)	1

WARNING:

To protect eyes from laser beam during servicing, DO NOT LOOK AT THE LASER BEAM.

Note: Laser Diode Properties

Material:	GaAlAs
Wavelength:	790 nm — 820 nm
Emission Duration:	continuous
Laser Output:	0.7 mW max.
Classification:	Class III b

2. PICKUP REPLACEMENT PROCEDURES

2.1. Notice in Handling Pickup

In case of repair or replacement of the Pickup, pay attention to the following handling instructions since the laser diode in the Pickup is not resistant to static electricity.

(1) Repair or replace on a work stand on which the conducting rubber is spread.
(2) Use ceramic soldering iron with GND.
(3) Since Pickup is supplied as a spare part in a conductive bag, take it out of the bag only when you need it.
(4) Remove the shorting pin and conductive sponge that short the connector pins of the Pickup after entire work is completed.
(5) Do not turn the adjustment screws (Focus Screw, RF Signal Phase Screw and Tracking Screw) of the Pickup. If they are turned widely, it may take much time to readjust them.

2.2. Pickup Replacement Procedures

(1) Place the Compact Disc Player upside down on the work stand and remove the Bottom Cover by unfastening 10 screws.
(2) Rotate the pulley of the Disc Mechanism Ass'y to move the Pickup in the direction of the arrow. See Fig. 2.1.
(3) Remove F01, F02 and F03, and pull out F04. See Fig. 2.2.
(4) Remove F05, F06 and F07, and pull out F08. See Fig. 2.3.

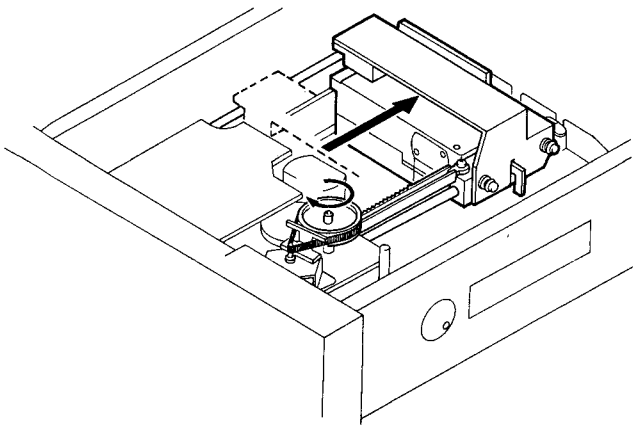


Fig. 2.1

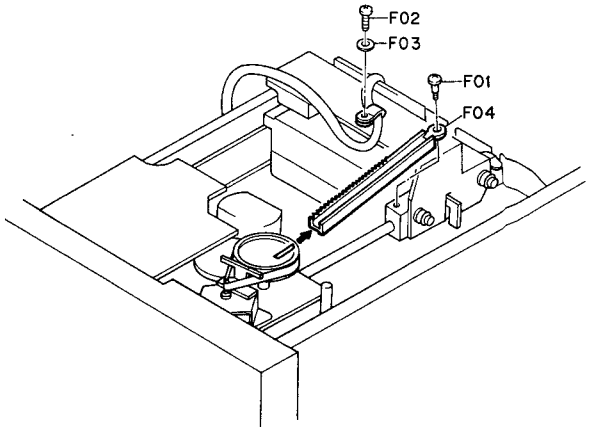


Fig. 2.2

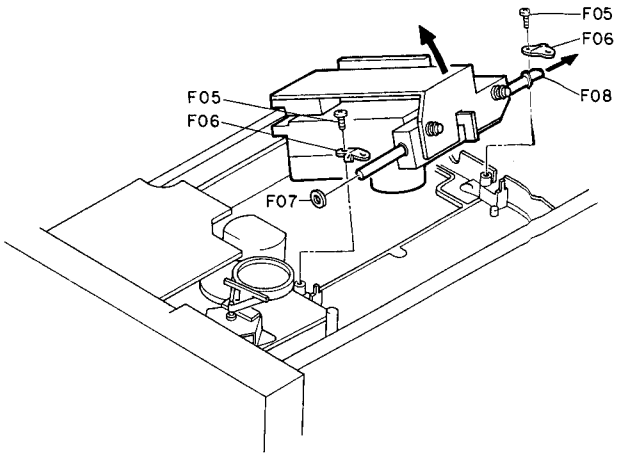


Fig. 2.3

(5) Remove two connectors, unsolder the two-core shield cable, and unsolder F09 to separate F09 from the Pickup. See Fig. 2.4.
(6) Loosen F10 and remove F11 (Pickup). See Fig. 2.5.
(7) Mount a new Pickup and temporarily fasten it with F10. See Fig. 2.5.
(8) Remove the conductive sponge of the new Pickup.
(9) Mount F09 on the new Pickup by soldering. Plug in the two connectors and solder the two-core shield cable to the original place. Soldering of the shield cable must be made in the order of GND wire with black tube and then signal wires.
(10) Mount the new Pickup by reversing the disassembly procedures.
(11) Pull F12 (shorting pin) out of the Pickup. See Fig. 2.6.

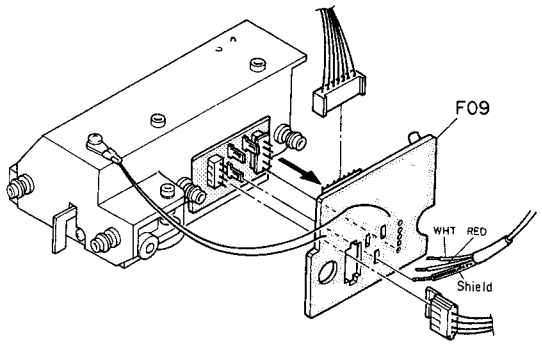


Fig. 2.4

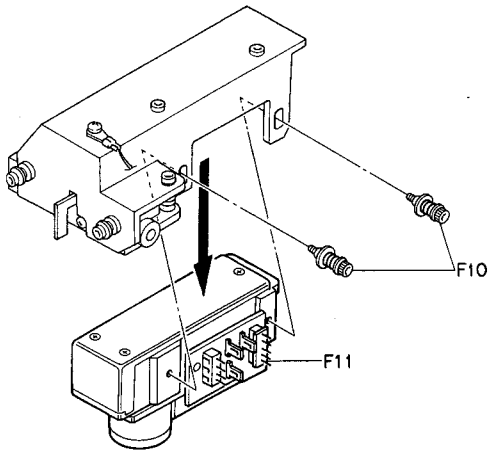


Fig. 2.5

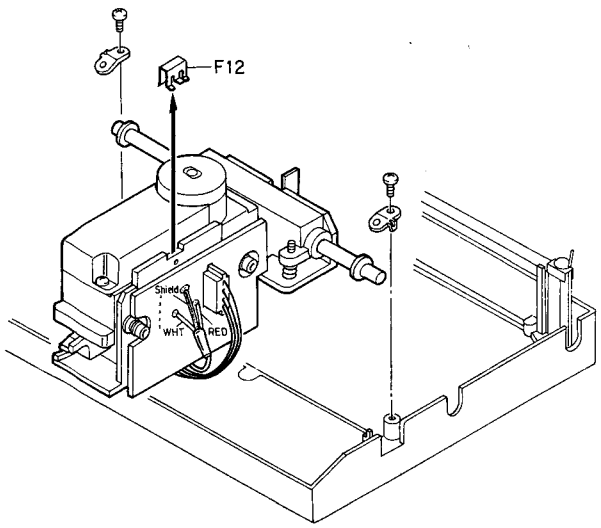


Fig. 2.6

2.3. Adjustment After Replacement of Pickup

Upon completion of replacement of the Pickup, perform rough adjustments following the flow chart shown in Fig. 2.7. Then proceed to the final stage adjustment, i.e., "Adjustment Instructions" in item 5.2 except step 1 "Laser Power Adjustment" (step 1 is already done in the rough adjustment).

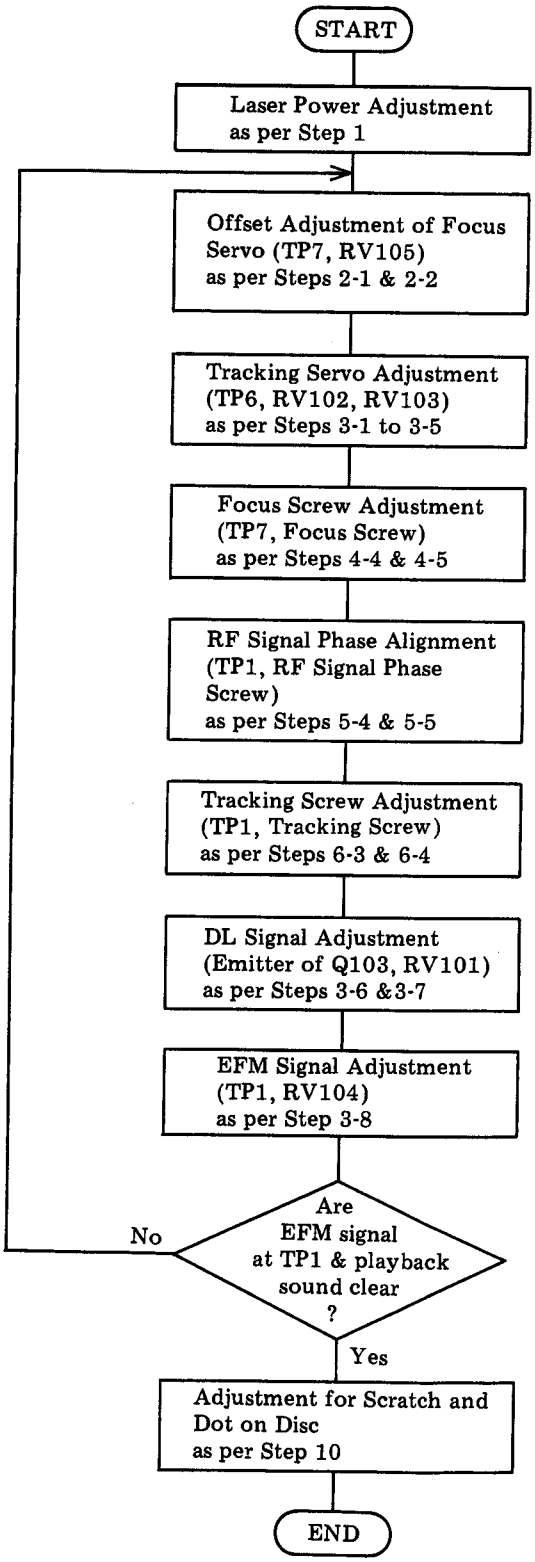

START
Laser Power Adjustment as per Step 1
Offset Adjustment of Focus Servo (TP7, RV105) as per Steps 2-1 & 2-2
Tracking Servo Adjustment (TP6, RV102, RV103) as per Steps 3-1 to 3-5
Focus Screw Adjustment (TP7, Focus Screw) as per Steps 4-4 & 4-5
RF Signal Phase Alignment (TP1, RF Signal Phase Screw) as per Steps 5-4 & 5-5
Tracking Screw Adjustment (TP1, Tracking Screw) as per Steps 6-3 & 6-4
DL Signal Adjustment (Emitter of Q103, RV101) as per Steps 3-6 &3-7
EFM Signal Adjustment (TP1, RV104) as per Step 3-8
Are EFM signal at TP1 & playback sound clear ?
No
Yes
Adjustment for Scratch and Dot on Disc as per Step 10
END

Fig. 2.7

3. MEASUREMENT INSTRUMENTS AND TEST DISCS

(1) Synchroscope (15 MHz or more)
(2) VTVM
(3) DC Voltmeter
(4) Optical Power Meter
(5) Philips Test Sample Disc 5A
(6) Sony Test C.D. YEDS-7
(7) LPF (Low Pass Filter):
Pass Band — 4 Hz to 20 kHz, Attenuation — 60 dB or more for 24.1 kHz or higher frequency
Recommended LPF: Philips Type 7122 780 29020
(8) Distortion Meter

4. PARTS LOCATION FOR ADJUSTMENT

4.1. Parts on P.C.B. Ass'y

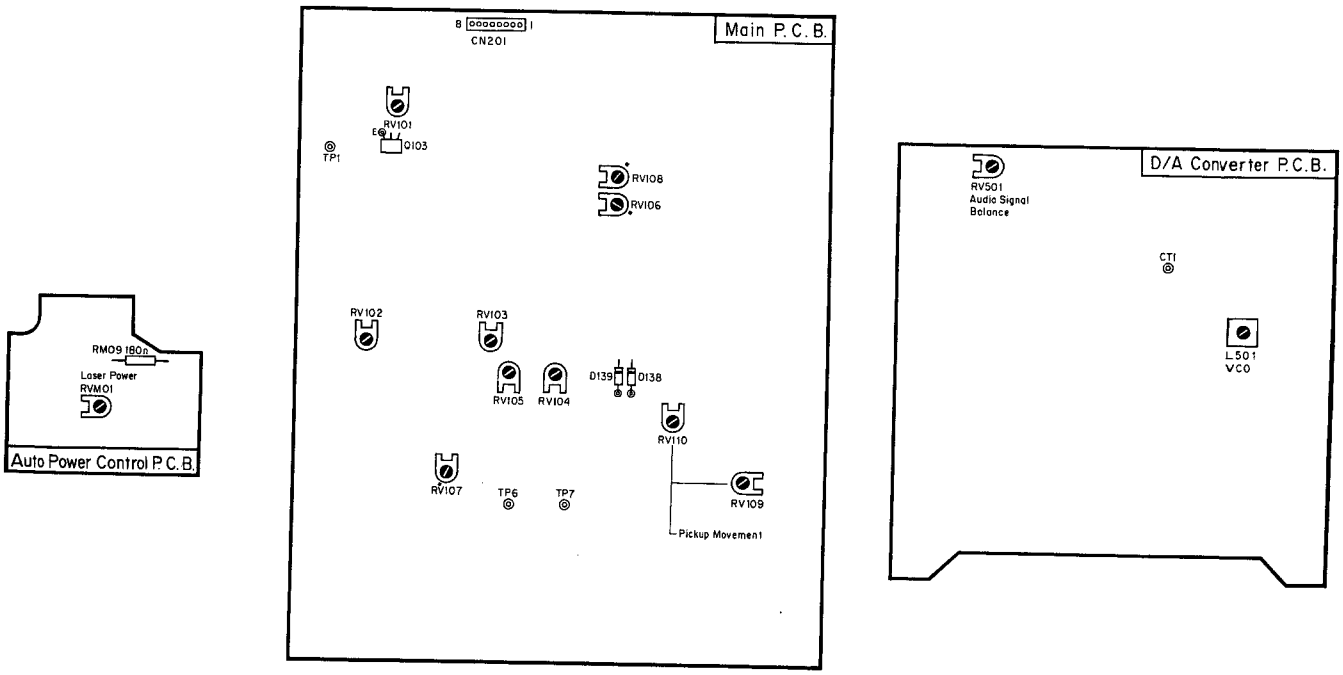


Fig. 4.1

4.2. Parts on Pickup

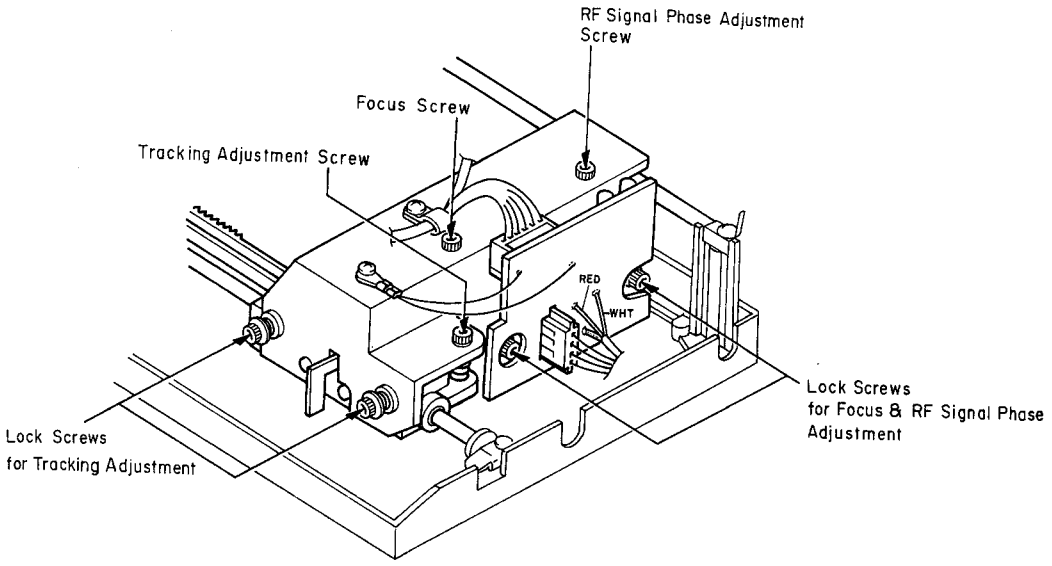


Fig. 4.2

5. ADJUSTMENTS

5.1. Note

Pay attention to the following before adjustment.

(1) Keep the Compact Disc Player horizontal during adjustment.
(2) Before starting adjustment, allow three minutes after the power is turned ON. Offset voltate will be stabilized in this period of time.
(3) When a Philips 5A test disc is used, perform the adjustment while listening to the playback sound.
(4) Connect a low pass filter (pass band: 4 Hz to 20 kHz) in series to the distortion meter to be used.
(5) When the Main P.C.B. Ass'y is replaced with new one, set each of the potentiometers as follows:

RV106, RV107:	1 o'clock direction (marked on the P.C.B.)
RV108:	10 o'clock direction (marked on the P.C.B.)
Others:	Mechanical center positions

(6) Potentiometers that are not stated in the adjustment instructions must be set to the preset positions stated in (5).
(7) When the Auto Power Control P.C.B. Ass'y or Pickup is replaced with new one, turn the potentiometer RVM01 full counterclockwise to prevent damage to the Pickup.
(8) Keep the Pickup Lens clean. Carefully clean it with lens cleaner or similar tools.

Danger: Invisible laser radiation when opened and interlock failed or defeated. Avoid direct exposure to beam.

5.2. Adjustment Instructions

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
1	Laser Power Adjustment	None	Optical Power Meter to Pickup Lens or DC Voltmeter across RM09 on Auto Power Control P.C.B.	Auto Power Control P.C.B. RVM01	**1. Using Optical Power Meter** a. Unsolder one of the leads of diode D135 on the Main P.C.B. Ass'y. b. See Fig. 5.1. Remove the Feed Motor Belt and, with rotating the Pulley, position the Pickup so that an optical power meter can be put onto the lens of the Pickup. Position the optical power meter at such a position and angle that provide maximum power meter reading. c. Check that RVM01 is at full counterclockwise position, and then turn ON the power. d. Rotate RVM01 slowly clockwise until the power meter reads 0.27 mW. **Caution:** Use care not to exceed 0.3 mW at any moment, otherwise Pickup will be damaged. e. Turn OFF the power and then solder the lead of D135 and put the belt on the feed motor. **2. Without using Optical Power Meter** a. Unsolder one of the leads of diode D135 on the Main P.C.B. Ass'y. b. Connect a DC voltmeter across RM09 (180-ohm 1 W) on the Auto Power Control P.C.B. Ass'y. c. Check that RVM01 is at full counterclockwise position, and then turn ON the power. d. Rotate RVM01 slowly clockwise until the reading on the DC voltmeter reaches 90% of the operating current Iop. Iop is marked on the Pickup (however, it is actually marked as Io). Example: If Iop is 37 mA, the voltmeter reading which corresponds to 90% of Iop is 0.037 (A) x 0.9 x 180 (ohms) = 5.99 (V). **Caution:** Use care not to exceed Iop at any moment, otherwise the Pickup will be damaged. In this example (Iop = 37 mA), the limit is 6.66 V. e. Turn OFF the power and then solder the lead of D135.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
2	Focus Servo Adjustment	Test Disc Philips 5A	Synchroscope to TP1,TP7 on Main P.C.B.	Main P.C.B. RV104,RV105	1. Set a synchroscope to DC input and 50 mV/div., and connect it to TP7. 2. Adjust RV105 to obtain 0±50 mV on the synchroscope. 3. Connect the synchroscope to TP1 and play back the test disc. 4. While listening to the playback sound, adjust RV104 so that the horizontal waving of the EFM (Eight-to-Fourteen Modulation) signal at TP1 is minimized and the EFM signal waveform becomes clear. See Fig. 5.2.
3	Tracking Servo Adjustment	Test Disc Philips 5A	Synchroscope to TP1,TP6, emitter of Q103 on Main P.C.B.	Main P.C.B. RV101,RV102 RV103,RV104	1. Set a synchroscope to DC input and 50 mV/div., and connect it to TP6. 2. Adjust RV103 to obtain 0-100 mV on the synchroscope. 3. Short between pins 4 (A+C signal) and 5 (GND) of CN201 and between pins 6 (GND) and 7 (B+D signal) of CN201 on the Main P.C.B. Ass'y. Short between the emitter and the base of Q113 on the Main P.C.B. Ass'y. 4. Adjust VR102 to obtain 0-50 mV on the synchroscope. 5. Remove the short of CN201 and Q113. 6. Connect the synchroscope to the emitter of Q103 and play back the test disc. 7. Adjust RV101 to obtain minimum DL signal (RF error signal) on the synchroscope. 8. Connect the synchroscope to TP1 and, while listening to the playback sound, adjust RV104 so that EFM signal is maximized and becomes clear.
4	Focus Screw Adjustment	Test Disc Philips 5A	Synchroscope to TP7 on Main P.C.B.	Main P.C.B. RV105 Focus Screw	1. Loosen the two Lock Screws used for focus adjustment by referring to Fig. 4.2. 2. Set a synchroscope to DC input and 50 mV/div., and connect it to TP7. 3. Adjust RV105 to obtain 0±50 mV on the synchroscope. 4. Play back the 7th or 8th music on the test disc. 5. While listening to the playback sound, adjust the Focus Screw of the Pickup to obtain exactly or approximately 0 V on the synchroscope. 6. After completion of adjustment, securely tighten the Lock Screws alternately.

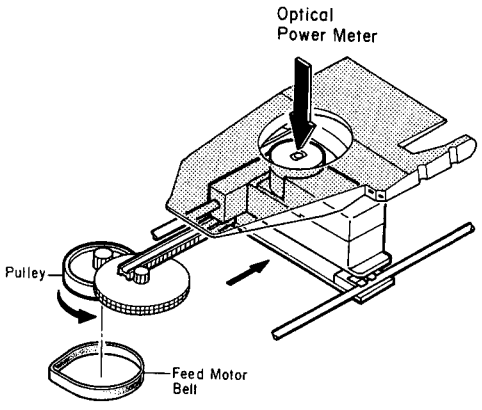


Fig. 5.1

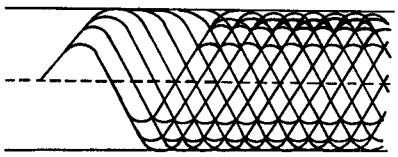


Fig. 5.2 EFM Signal at TP1

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
5	RF Signal Phase Adjustment	Test Disc Philips 5A	Synchroscope to TP1 on Main P.C.B.	Main P.C.B. RV104 RF Signal Phase Screw	1. Loosen the two Lock Screws used for RF signal phase alignment by referring to Fig. 4.2. 2. Connect a synchroscope to TP1 and play back the test disc. 3. While listening to the playback sound, adjust RV104 so that the horizontal waving of the EFM signal at TP1 is minimized and the EFM signal becomes clear. 4. Play back the 7th or 8th music on the test disc. 5. Adjust the RF Signal Phase Screw of the Pickup so that the EFM signal waveform at TP1 becomes clear and maximized and that its horizontal waving is minimized. 6. Repeat 2. to 5. above two or three times. 7. Securely tighen the Lock Screws alternately.
6	Tracking Screw Adjustment	Test Disc Philips 5A	Synchroscope to TP1,TP6, emitter of Q103 on Main P.C.B.	Tracking Screw Main P.C.B. RV101,RV102 RV103,RV104	1. Loosen the two Lock Screws used for tracking adjustment by referring to Fig. 4.2. 2. Conduct step 3 "Tracking Servo Adjustment". 3. Connect a synchroscope to TP1 and play back the 7th or 8th music on the test disc. 4. While listening to the playback sound, adjust the Tracking Screw of the Pickup so that the EFM signal at TP1 becomes clear and maximized. 5. Connect the synchroscope to the emitter of Q103 and adjust RV101 to obtain minimum DL signal on the synchroscope. 6. While listening to the playback sound, adjust RV104 so that the EFM signal at TP1 is maximized and becomes clear. 7. Securely tighten the Lock Screws alternately.
7	VCO Adjustment	Test Disc Philips 5A	Synchroscope to test point CT1 on D/A Converter P.C.B.	D/A Converter P.C.B. L501	1. Connect a synchroscope to the test point CT1 and play back the 18th music, Finger Print, on the test disc. 2. While listening to the playback sound and observing the VCO signal level on the synchroscope, turn the core of L501 counterclockwise and clockwise to find out the upper and the lower limits of VCO voltage, i.e., the limits at which the playback sound is about to cut off. 3. Adjust the core of L501 so that the VCO level is the midpoint between the upper and lower limit voltages. (This VCO level will be approx. a little under 5.0 V).
8	Pickup Movement Adjustment	Test Disc Philips 5A	Synchroscope to anode of D138 (or pin 3 of U115), anode of D139 (or pin 11 of U115) on Main P.C.B.	Main P.C.B. RV109,RV110	1. Connect a synchroscope to the anode of the diode D138. 2. Play back the test disc and then press the F. Fwd button to set the Compact Disc Player in Cue mode. 3. Adjust RV109 to obtain a 180 μsec pulse width. See Fig. 5.3.1. 4. Press the F. Fwd button further several times, and check whether the time indication on the Time Indicator regularly increases. If not, repeat 3. 5. Connect the synchroscope to the anode of diode D139. 6. Play back the test disc and then press the Rev button to set the Compact Disc Player in Cue mode. (to be continued)

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
					7. Adjust RV110 to obtain a 160 μsec pulse width. See Fig. 5.3.2. 8. Press the Rev button further several times, and check whether the Time Indicator regularly changes its time indication. If not, repeat 7.
9	Audio Signal Balance Adjustment	Test Disc Sony YEDS-7	VTVM to Output Pin Jacks	D/A Converter P.C.B. RV501	1. Play back the first music on the test disc to play back 1 kHz 0 dB level signals. 2. Measure both L and R channel output levels and adjust RV501 so that the difference between them is less than 0.1 V.
10	Adjustment for Scratch and Dot on Disc	Test Disc Philips 5A	Synchroscope to TP1 on Main P.C.B.	Main P.C.B. RV104	**1. Scratch 900 μm** Play back the 9th music with a 900 μm scratch on the test disc and listen to the playback sound. If playback is not made properly, conduct step 6 "Tracking Screw Adjustment". Turn the Tracking Screw counterclockwise when tracking stops, but turn it clockwise when track is skipped. If still proper playback is not made yet, conduct step 7 "VCO Adjustment". **2. Black Dot 800 μm** Play back the 17th music with a 800 μm black dot on the test disc. If playback is not made properly, that is, if tracking stops, make the following adjustment: 1. Set a synchroscope to 1 msec/div. and connect it to TP1. 2. Adjust RV104 so that the waveform at TP1 is as shown in Fig. 5.4.2 when passing through a black dot.

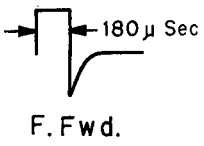


Fig. 5.3.1

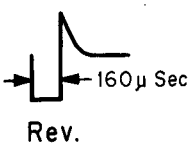


Fig. 5.3.2

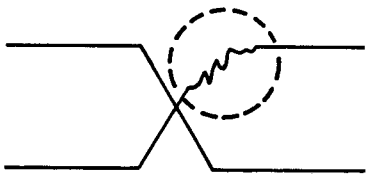


Fig. 5.4.1 Before Adjustment

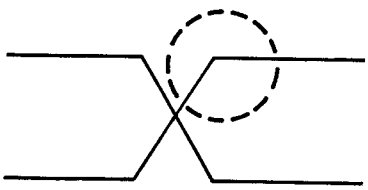


Fig. 5.4.2 After Adjustment

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	ADJUST-MENT	REMARKS
11	Tracking Adjustment with Eccentric Disc	Approx. 0.1mm Eccentric Disc	Positive side of C173 on Main P.C.B.	Main P.C.B. RV108,RV109 RV110	Perform this adjustment only if a disc with eccentricity is not played back properly. Precisely re-adjust Step 3 "Tracking Servo Disc Adjustment" and Step 6 "Tracking Screw Adjustment", and check whether playback is made properly. If not, perform the following adjustment to insure correct tracking for a 0.1 mm eccentric disc. 1. Preparation for 0.1 mm Eccentric Disc Find a disc with approx. 0.1 mm eccentricity in the following manner: a. Set a synchroscope to DC input and connect it to the positive side of C173 on the Main P.C.B. Ass'y. b. Play back the first music on eccentric discs and press the Pause button to set the Compact Disc Player in Pause mode. Then observe the peak-to-peak level (Vpp) on the synchroscope. The amount of eccentricity, X (mm), is given in the following formula: $X = 1/2 \times (1.3 \times (Vpp/(5.8 + 4.7))$ where, 1.3 mm/A: sensitivity of Tracking Servo 5.8 ohms: DC resistance value of Traking Coil 4.7 ohms: value of resistor R197 If amount of eccentricity (X) is assumed to be 0.1 mm, $Vpp = 2 \times (5.8 + 4.7)/1.3 \times 0.1 = 1.6$ (V) That is, the disc which shows approx. 1.6 V on the synchroscope should be selected. 2. Load the disc found in 1 above and play back the first music of the disc. Check whether it takes much time to enter Standby mode or whether the time indication of the Time Indicator begins with 00:00. If not, re-adjust Step 3 "Tracking Servo Adjustment" and then turn RV108 approx. 10 degrees in the counterclockwise direction. 3. During playback, press the F. Fwd button several times and check that the time indication of the Time Indicator regularly increases. If not, turn RV109 to correct it. 4. Next, during playback, press the Rev button several times to see whether the time indication of the Time Indicator regularly decreases. If not, turn RV110 to correct it.

6. MECHANISM ASS'Y AND PARTS LIST

6.1. Synthesis

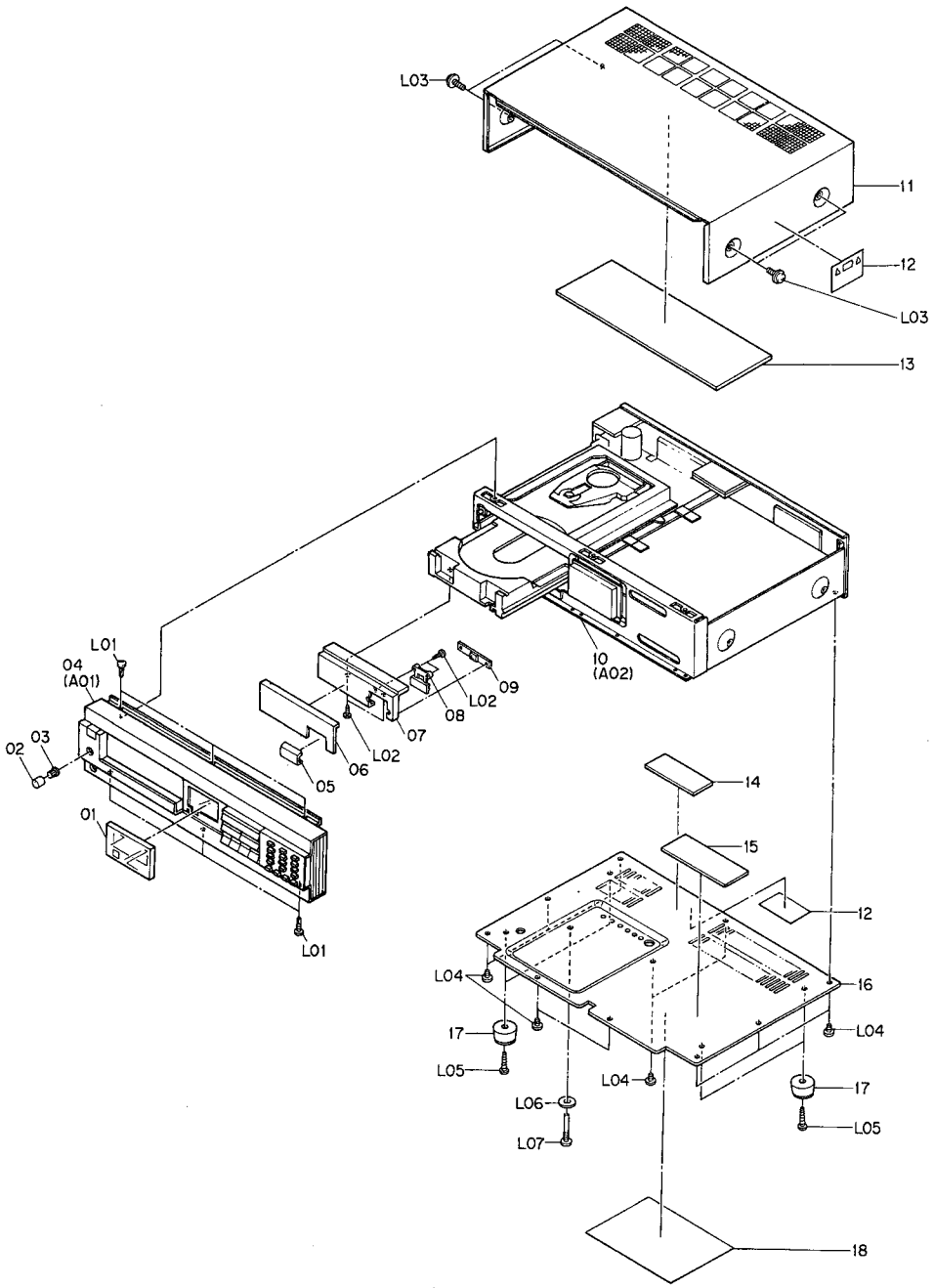


Fig. 6.1

Schematic Ref. No.	Part No.	Description	Q'ty
		Synthesis	
01	0C80712A	Indicator Lens	1
02	0C80713A	Volume Knob Cap	1
03	0C80714A	Volume Knob	1
04	CA80247A	Front Panel Ass'y OMS-7	1
	CA80248A	Front Panel Ass'y OMS-7E	1
	CA80249A	Front Panel Ass'y OMS-70	1
05	0C80715A	Eject Button	1
06	0C80716A	Lid	1
07	0C80717A	Lid Frame	1
08	0C80718A	Eject Button Base	1
09	CA80237A	Eject/Load Switch P.C.B. Ass'y	1
10	—	Chassis Ass'y	1
11	0C80719A	Top Cover	1
12	0M04377A	Caution Label A	2
13	0C80720A	Vibration Isolating Sheet A	1
14	0C81062A	Vibration Isolating Sheet B (except U.S.A.)	1
15	0C81063A	Vibration Isolating Sheet C (U.S.A.)	2
	0C81063A	Vibration Isolating Sheet C (except U.S.A.)	1
16	0C80721A	Bottom Cover	1
17	0C80722A	Leg	4
18	0M04621B	Caution Label B	1
L01	0E00921A	BT 3x8 ⊕ Binding (Black Chromate)	6
L02	0E00855A	BT 2.6x6 ⊕ Binding	2
L03	0C81064A	M4x8 ⊕ Pan Washer-faced (Black Chromate)	4
L04	0E00970A	M3x4 ⊕ Binding	10
L05	0E00888A	BT 3x12 ⊕ Binding	4
L06	0C81267A	Shipping Washer	1
L07	0C81095A	Shipping Screw	1

6.2. Front Panel Ass'y (A01)

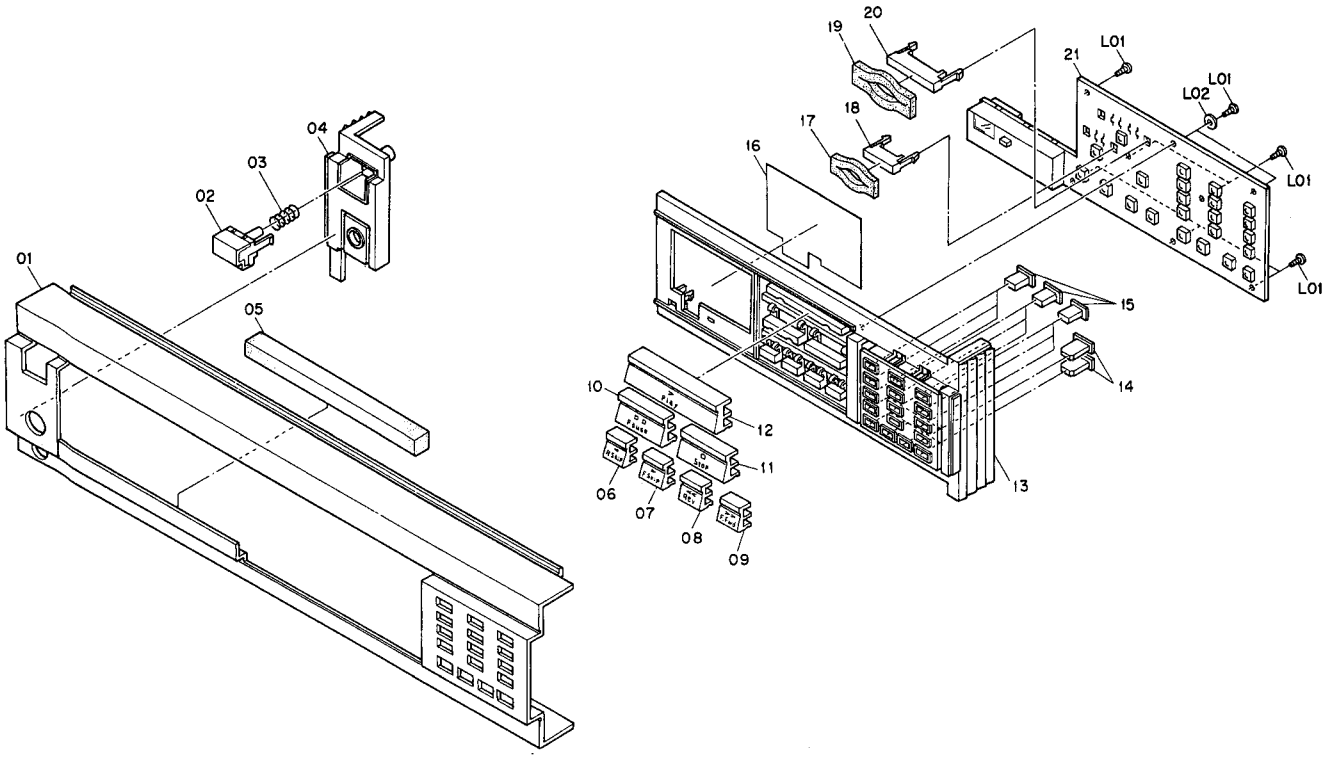


Fig. 6.2

Schematic Ref. No.	Part No.	Description	Q'ty
A01	CA80247A	Front Panel Ass'y OMS-7	1
	CA80248A	Front Panel Ass'y OMS-7E	1
	CA80249A	Front Panel Ass'y OMS-70	1
01	0C81354A	Front Panel OMS-7	1
	0C81355A	Front Panel OMS-7E	1
	0C81356A	Front Panel OMS-70	1
02	CA80355A	Power Button Ass'y	1
03	0C80723A	Spring	1
04	0C80724A	Side Frame L	1
05	0C80725A	Sponge A	1
06	0C81367A	R. Skip Button	1
07	0C81366A	F. Skip Button	1
08	0C81369A	Rev Button	1
09	0C81368A	F. Fwd Button	1
10	0C81365A	Pause Button	1
11	0C81364A	Stop Button	1
12	0C81363A	Play Button	1
13	0C81370A	Side Frame R	1
14	0C80726A	Push Switch Button A	6
15	0C80705A	Push Switch Button B	11
16	0C80706A	FL Filter	1
17	0C81375A	Sponge B	1
18	0C80707A	LED Holder A	1
19	0C81376A	Sponge C	1
20	0C80708A	LED Holder B	1
21	CA80244A	Control Switch P.C.B. Ass'y	1
L01	0E00792A	BT 2.6x8 ⊕ Binding	8
L02	0E03121A	Fiber Washer 2.6x5x0.8	2

6.3. Chassis Ass'y (A02)

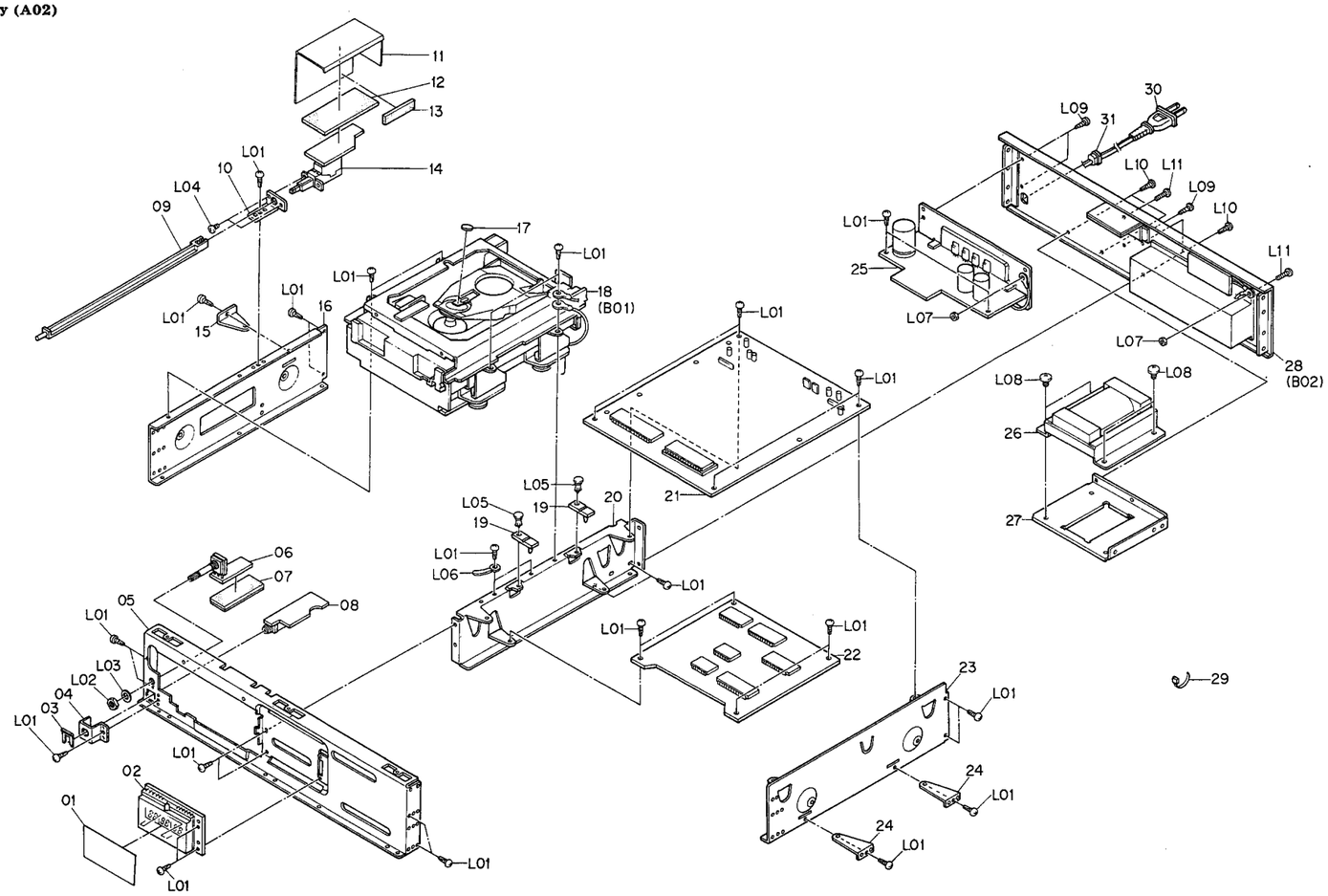


Fig. 6.3

Schematic Ref. No.	Part No.	Description	Q'ty
A02	—	Chassis Ass'y	1
01	0C80689A	FL Filter A	1
02	CA80243A	FL Indicator P.C.B. Ass'y	1
03	0C80690A	Headphone Jack Plate	1
04	0C80690A	Headphone Jack Bracket	1
05	0C80691A	Front Chassis	1
06	CA80238A	Volume P.C.B. Ass'y	1
07	0C80692A	Volume Insulator	1
08	CA80231A	Headphone Amp. P.C.B. Ass'y	1
09	0C80693A	Joint Bar	1
10	0C80694A	Power Switch Bracket	1
11	0C80695A	Power Switch Insulator	1
12	0C80696A	Power Switch Sponge A	1
13	0C80697A	Power Switch Sponge B	1
14	CA80240A	Power Switch P.C.B. Ass'y	1
15	0C80698A	P.C.B. Bracket L	1
16	0C80699A	Side Chassis L	1
17	0C81066A	Damper Spring	1
18	CA80256A	Disc Mechanism Ass'y	1
19	0C81065A	Hinge	2
20	0C80700A	Center Chassis	1
21	CA80246A	Main P.C.B. Ass'y	1
22	CA80233A	D/A Converter P.C.B. Ass'y	1
23	0C80701A	Side Chassis R	1
24	0C80702A	P.C.B. Bracket R	2
25	CA80232A	Power Supply P.C.B. Ass'y	1
26	0C80760A	Power Transformer 100V (Japan)	1
	0C80761A	Power Transformer 120V (U.S.A. & Canada)	1
	0C80762A	Power Transformer 220V (220V Class 2)	1
	0C80763A	Power Transformer 240V (Australia)	1
	0C80764A	Power Transformer 110V/ 220-240V (Others)	1
27	0C80703A	Power Transformer Bracket	1
28	CA80250A	Rear Panel Ass'y OMS-70 (Japan)	1
	CA80251A	Rear Panel Ass'y OMS-7 (U.S.A., Canada & Australia)	1
	CA80252A	Rear Panel Ass'y OMS-7E	1
	CA80254A	Rear Panel Ass'y OMS-7 (Others)	1
29	0B08515A	Insu-Lock	1
30	0C81208A	Power Cord OMS-70 (Japan)	1
	0C81209A	Power Cord OMS-7 (U.S.A., Canada & Others)	1
	0C81210A	Power Cord OMS-7E	1
	0C81211A	Power Cord OMS-7 (Australia)	1
31	0B08037U	Cord Bushing	1
—	0B08347U	Fuse T1A 250V (220V Class 2)	2
—	0B08457A	Fuse T500mA 250V (220V Class 2)	2
L01	0C81033A	BT 3x8 ⊕ Round	35
L02	—	Nut	1
L03	—	Washer	1
L04	0E00522A	M3x4 ⊕ Pan	2
L05	0E08583A	Plastic Rivet	2
L06	0C08704A	Wire Clamper	1
L07	0C00507A	Nut Hex. M3	2
L08	0E00558A	M4x6 ⊕ Pan	4
L09	0E00921A	BT 3x8 ⊕ Binding (Black Chromate)	3
L10	0C81032A	BT 3x8 ⊕ Nailtap Screw (Black Chromate)	4
L11	0E00818A	M3x8 ⊕ Binding (Black Chromate)	2

6.4. Disc Mechanism Ass'y (B01)

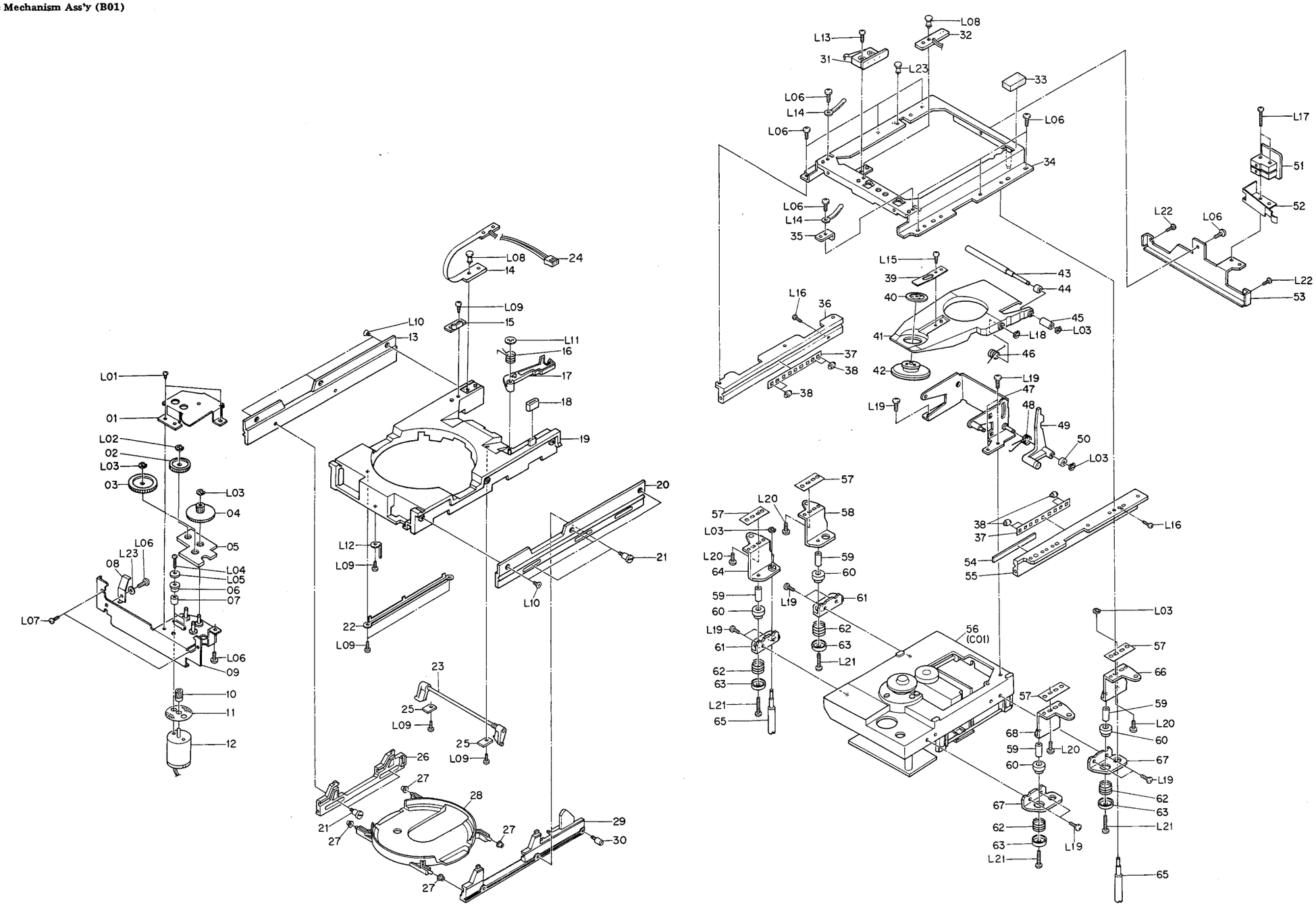


Fig. 6.4

Schematic Ref. No.	Part No.	Description	Q'ty
B01	CA80256A	Disc Mechanism Ass'y	1
01	0C81156A	Gear Cover	1
02	0C80998A	Gear A	1
03	0C80997A	Gear B	1
04	0C80996A	Gear C	1
05	0C81005A	Damper A	1
06	0C80995A	Bushing	2
07	0C80984A	Spacer	2
08	0C80972A	Spring	1
09	CA80283A	Gear Bracket Ass'y	1
10	0C81001A	Gear M	1
11	0C81006A	Sheet	1
12	0C81360A	Loading Motor	1
13	0C80982A	Box Rail L	1
14	0C81058A	Flexible P.C.B.	1
15	0C80971A	Switch Plate	1
16	0C81145A	Lock Arm Spring	1
17	0C81007A	Lock Arm	1
18	0C80999A	Cushion	1
19	0C80994A	Disc Drawer	1
20	0C80981A	Box Rail R	1
21	0C80985A	Guide Screw A	4
22	0C81149A	Cord Cover	1
23	CA80354A	Rack Arm Ass'y	1
24	CA80279A	2P Connector Cord Ass'y	1
25	0C80976A	Rack Arm Plate	2
26	0C81009A	Rack B	1
27	0C81143A	Table Roller	4
28	0C81010A	Disc Tray	1
29	0C81008A	Rack A	1
30	0C80983A	Guide Screw B	2
31	CA80239A	Open End Switch P.C.B. Ass'y	1
32	CA80234A	Photo Diode P.C.B. Ass'y	1
33	0C81350A	Sponge	1
34	CA80280A	Box Guide Ass'y	1
35	0C80973A	Stopper	1
36	0C80975A	Guide Rail L	1
37	0C81003A	Roller Guide	2
38	0C81000A	Roller	8
39	0C80941A	Chuck Spring	1
40	0C80940A	Chuck B	1
41	0C80949A	Chuck Arm	1
42	0C80948A	Chuck A	1
43	0C80942A	Arm Shaft	1
44	0C80946A	Collar B	1
45	0C80945A	Collar A	1
46	0C80943A	Chuck Arm Spring	1
47	CA80277A	Arm Bracket Ass'y	1
48	0C80944A	Timing Arm Spring	1
49	CA80276A	Timing Arm Ass'y	1
50	0C80947A	Collar C	1
51	CA80236A	Close End Switch P.C.B. Ass'y	1
52	0C81158A	Switch Holder	1
53	0C80969A	Rear Bracket	1
54	0C81004A	Sheet	1
55	0C80974A	Guide Rail R	1
56	CA80353A	Disc Mechanism Sub Ass'y	1
57	0C81002A	Guide Sheet	4
58	0C80992A	Rear Bracket L	1
59	0C81016A	Collar	4
60	0C81022A	Damper B	4
61	0C80773A	Mechanism Bracket L	2
62	0C81020A	Mechanism Spring	4
63	0C81018A	Damper Washer	4
64	CA80282A	Front Bracket L Ass'y	1
65	0C81017A	Shipping Screw	2
66	CA80281A	Rear Bracket R Ass'y	1
67	0C80774A	Mechanism Brackt R	1
68	0C80993A	Front Bracket R	1
L01	0C80963A	M2x1.8 ⊕Binding (Black Chromate)	2
L02	0E00042A	E-Ring 1.5mm	1
L03	0E00222A	E-Ring 2mm	6
L04	0C80959A	M2x4 ⊕Pan	2
L05	0E00029A	Washer 2x6x0.2	2
L06	0E00985A	M3x6 ⊕Binding (Black Chromate)	11
L07	0E03175A	M2.6x6 ⊕Pan (Black Chromate)	2
L08	0C80954A	Plastic Rivet	2
L09	0C80965A	BT 2.6x6 ⊕Nailtap Screw (Black Chromate)	5
L10	0E00678A	M2.6x6 ⊕Countersunk (Black Chromate)	6
L11	0E00967A	CS Stopper Ring 3mm	1
L12	0C80990A	Wire Clamp	1
L13	0C80955A	M2x8 ⊕Binding (Black Chromate)	1
L14	0C80991A	Wire Clamp	2
L15	0C80939A	BT 2.6x4 ⊕Nailtap Screw (Black Chromate)	1
L16	0C80964A	M2x6 ⊕Pan	2
L17	0C80956A	M2x16 ⊕Pan	2
L18	0E00698A	E-Ring 2.5mm	1
L19	0E03030A	M3x6 ⊕Binding (Nickel)	11
L20	0E00818A	M3x8 ⊕Binding (Black Chromate)	4
L21	0E00514A	M3x15 ⊕Pan	4
L22	0E03175A	M2.6x6 ⊕Pan (Black Chromate)	2
L23	0C80953A	Plastic Rivet	1

6.5. Rear Panel Ass'y (B02)

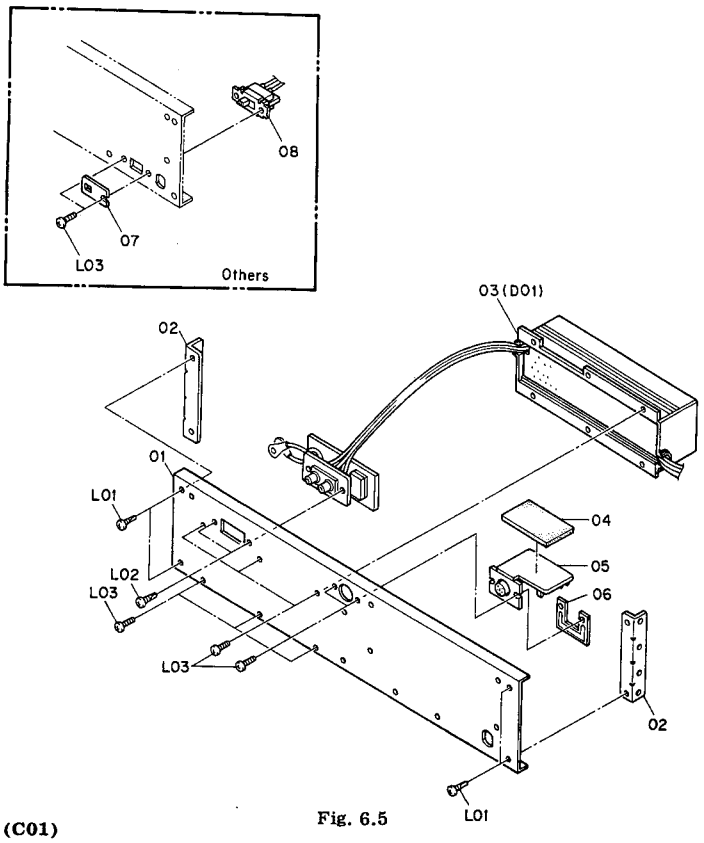


Fig. 6.5

6.6. Disc Mechanism Sub Ass'y (C01)

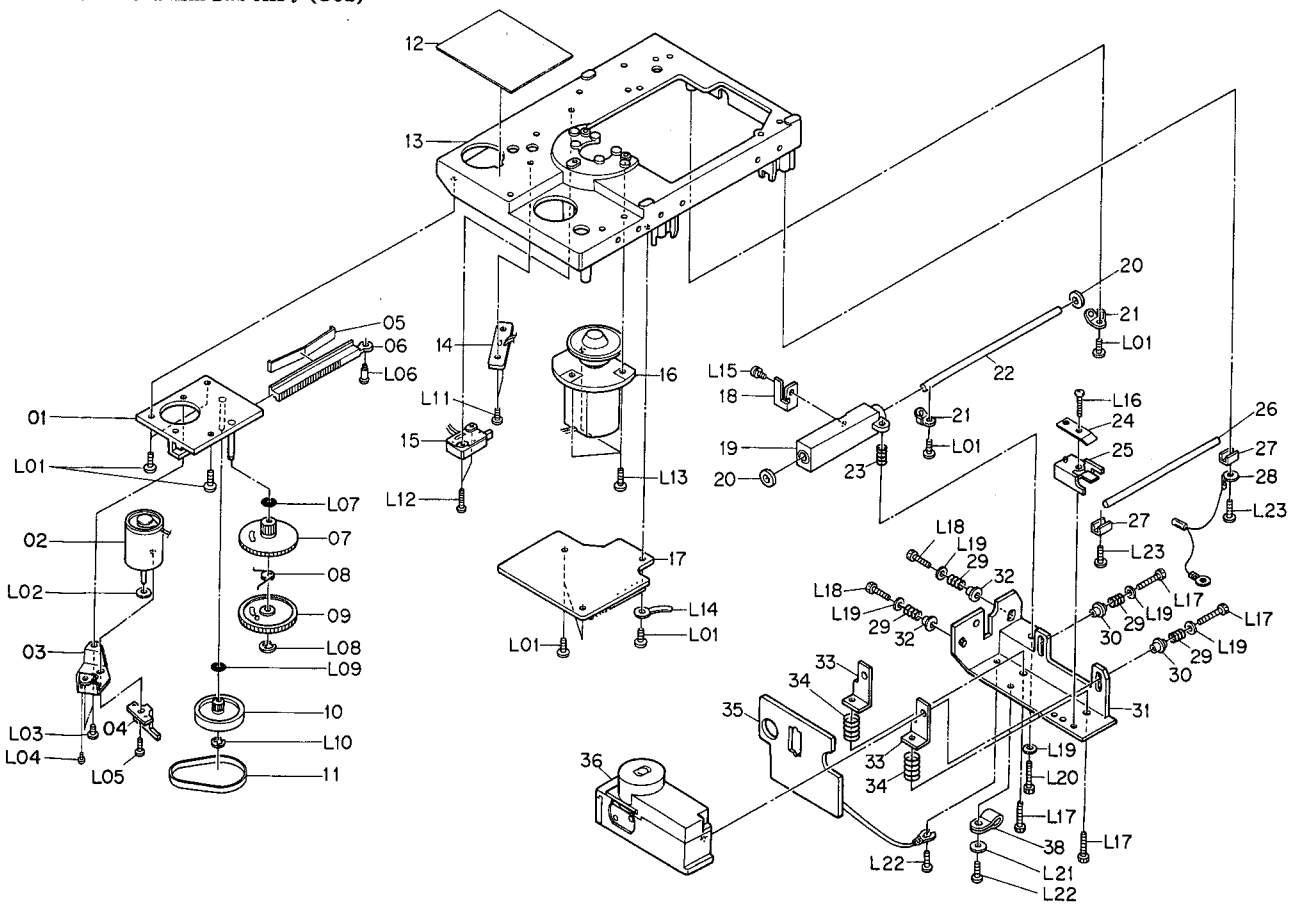


Fig. 6.6

6.7. Analog Processor Unit (D01)

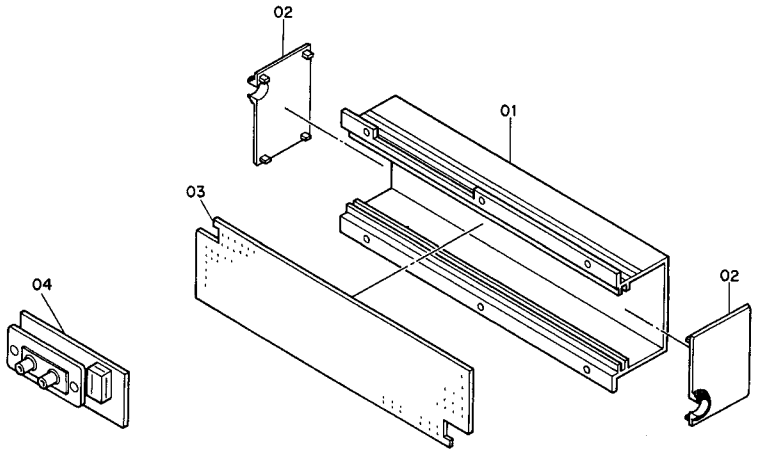


Fig. 6.7

Schematic Ref. No.	Part No.	Description	Q'ty
B02	**CA80251A**	**Rear Panel Ass'y OMS-7 (U.S.A., Canada & Australia)**	**1**
	CA80254A	**Rear Panel Ass'y OMS-7 (Others)**	**1**
	CA80252A	**Rear Panel Ass'y OMS-7E**	**1**
	CA80250A	**Rear Panel Ass'y OMS-70 (Japan)**	**1**
01	0C81360A	Rear Panel OMS-7 (U.S.A., Canada & Australia)	1
	0C81374A	Rear Panel OMS-7 (Others)	1
	0C81361A	Rear Panel OMS-7E	1
	0C81362A	Rear Panel OMS-70	1
02	0C80709A	Angle	2
03	BA05515A	Analog Processor Unit	1
04	0C81372A	Insulator	1
05	CA80245A	Remote Control P.C.B. Ass'y	1
06	0C80710A	DIN Jack Plate	1
07	0M03948A	Voltage Lock Plate OMS-7 (Others)	1
08	0B07092U	Voltage Selector OMS-7 (Others)	1
L01	0C81032A	BT 3x8 ⊕ Nailtap Screw	4
L02	0E00921A	BT 3x8 ⊕ Binding (Black Chromate)	2
L03	0E00818A	M3x8 ⊕ Binding (Black Chromate) (except OMS-7 (Others))	5
	0E00818A	M3x8 ⊕ Binding (Black Chromate) OMS-7 (Others)	7
C01	**CA80353A**	**Disc Mechanism Sub Ass'y**	**1**
01	CA80261A	Gear Base Ass'y	1
02	0C80820A	Feed Motor	1
03	0C80770A	Motor Bracket	1
04	0C80792A	Belt Guide	1
05	0C80782A	Rack Spring	1
06	0C80797A	Rack Gear	1
07	0C80790A	Gear A	1
08	0C80785A	Spring A	1
09	0C80789A	Gear C	1
10	0C80788A	Gear B	1
11	0C80793A	Belt	1
12	0C80794A	Sheet	1
13	0C80769A	Chassis	1
14	CA80242A	Photo Transistor P.C.B. Ass'y	1
15	0C80926A	Microswitch	1
16	0C80819A	Disc Motor	1
17	CA80241A	Auto Power Control P.C.B. Ass'y	1
18	0C80771A	Limiter Lever	1
19	0C80767A	Bearing	1
20	0C80795A	Damper	2
21	0C80775A	Holder Plate	2
22	0C80780A	Shaft A	1
23	0C80784A	Spring B	1
24	0C80776A	Plate Spring	1
25	0C80791A	Slider	1
26	0C80779A	Shaft B	1
27	0C80781A	Shaft Holder	2
28	CA80260A	Ground Wire Ass'y	1
29	0C80783A	Spring C	4
30	0C81338A	Bushing A	2
31	0C80768A	Pickup Bracket	1
32	0C80778A	Bushing B	2
33	0C80772A	Adjuster Bracket	2
34	0C80786A	Spring D	2
35	CA80235A	RF Pre-Amp. P.C.B. Ass'y	1
36	CA80255A	Laser Pickup Ass'y	1
L01	0E03030A	M3x6 ⊕ Binding (Nickel)	10
L02	—	Washer (Belongs to Feed Motor)	1
L03	0E00866A	M2.6x4 ⊕ Binding	2
L04	0E00804A	M2x4 ⊕ Binding (Black Chromate)	1
L05	0E00973A	M2x6 ⊕ Binding	1
L06	0C80777A	Pulley Support	1
L07	0C81126A	Mylar Washer 2.5mm	1
L08	0E00222A	E-Ring 2mm	1
L09	0C81127A	Mylar Washer 2mm	1
L10	0E00042A	E-Ring 1.5mm	1
L11	0C81340A	M2.6x6 ⊕ Binding (Nickel)	2
L12	0C81341A	M2.6x10 ⊕ Pan (Nickel)	2
L13	0E03031A	M3x8 ⊕ Binding (Nickel)	3
L14	0C80704A	Wire Clamp	1
L15	0E03046A	M2.6x6 ⊕ Pan (2A)	1
L16	0C81342A	M2.6x10 ⊕ Pan	1
L17	0C81343A	Bolt M3x12 (Hex. Socket Head)	4
L18	0C81344A	Bolt M3x10 (Hex. Socket Head)	2
L19	0C81346A	Washer 3mm (3x8x0.5)	5
L20	0C81345A	Bolt M3x16 (Hex. Socket Head)	1
L21	0E00249A	Washer 2.6mm (Nickel)	1
L22	0C81347A	M2.6x8 ⊕ Binding (Nickel)	1
L23	0E03138A	M3x10 ⊕ Binding (Nickel)	2
D01	**BA05515A**	**Analog Processor Unit**	**1**
01	0H04510A	Unit Case	1
02	0H04511A	Side Cover	2
03	BA05494A	Analog Processor P.C.B. Ass'y	1
04	BA05498A	Pin Jack P.C.B. Ass'y	1

7. MOUNTING DIAGRAMS AND PARTS LIST

Notes: 1. Mounting diagram shows a dip side view of the printed circuit board.
2. Diode is MA150, 1SS53, 1S1555, or 1SS176 unless otherwise specified.
3. Abbreviation for part name:
TR — Transistor, SiD — Silicon Diode, Varicap — Variable Capacitance Diode
RK — Carbon Resistor, RM — Metal Film Resistor, RF — Fail Safe Type Resistor
CE — Electrolytic Capacitor, CM — Mylar Capacitor, CC — Ceramic Capacitor,
CT — Tantalum Capacitor, C — Mica Capacitor

7.1. Photo Transistor P.C.B. Ass'y

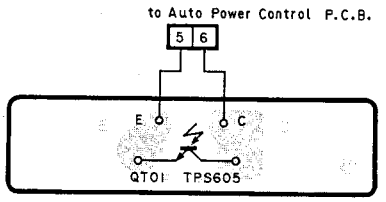


Fig. 7.1

7.2. Photo Diode P.C.B. Ass'y

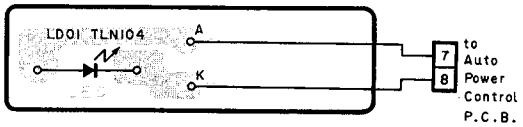


Fig. 7.2

7.3. Open End Switch P.C.B. Ass'y

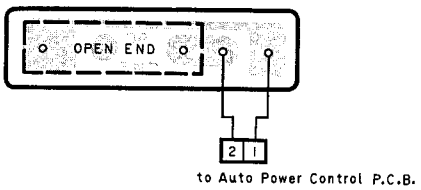


Fig. 7.3

7.4. Close End Switch P.C.B. Ass'y

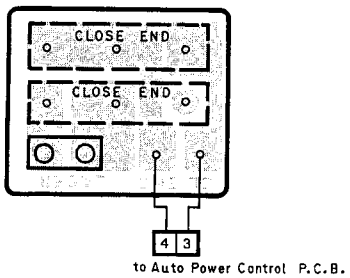


Fig. 7.4

7.5. Eject/Load Switch P.C.B. Ass'y

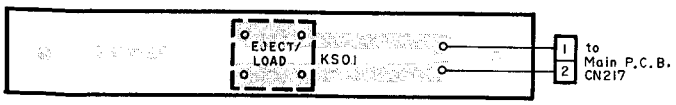


Fig. 7.5

7.6. Power Switch P.C.B. Ass'y

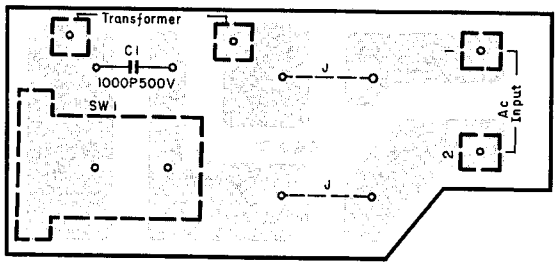


Fig. 7.6

7.7. Volume P.C.B. Ass'y

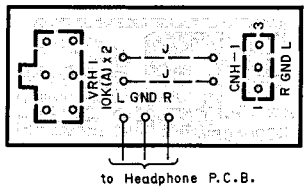


Fig. 7.7

7.8. Remote Control P.C.B. Ass'y

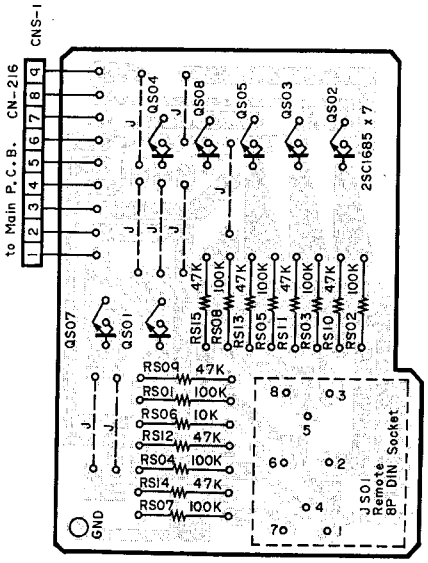


Fig. 7.8

7.9. Pin Jack P.C.B. Ass'y

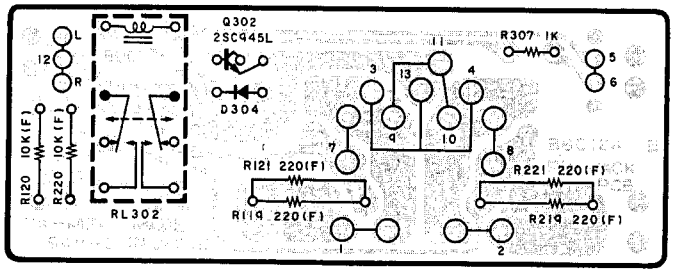


Fig. 7.9

7.10. FL Indicator P.C.B. Ass'y

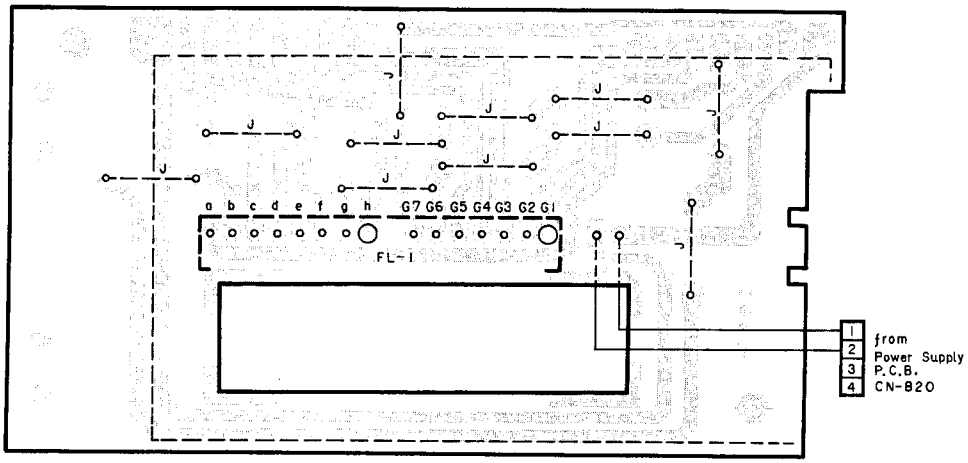


Fig. 7.10

Schematic Ref. No.	Part No.	Description
	CA80242A	Photo Transistor P.C.B. Ass'y
	0C81201A	Photo Transistor P.C.B.
QT01	0C80758A	Photo TR TPS605
	CA80234A	Photo Diode P.C.B. Ass'y
	0C81200A	Photo Diode P.C.B.
LD01	0C80759A	Photo Diode TLN104
	CA80239A	Open End Switch P.C.B. Ass'y
	0C81199A	Open End Switch P.C.B.
	0C80911A	Microswitch (1)
	CA80291A	2P Connector Cord Ass'y (1)
	CA80236A	Close End Switch P.C.B. Ass'y
	0C81180A	Close End Switch P.C.B.
	0C80912A	Microswitch (1)
	CA80237A	Eject/Load Switch P.C.B. Ass'y
	0C81195A	Eject/Load Switch P.C.B.
KS01	0C80913A	Key Switch B3F-1000

Schematic Ref. No.	Part No.	Description
	CA80240A	Power Switch P.C.B. Ass'y
	0C81202A	Power Switch P.C.B.
C1	0C81175A	CC 1000P 500V
SW1	0C80914A	Push Switch SDL1P-B
	CA80238A	Volume P.C.B. Ass'y
	0C81152A	Volume P.C.B.
VRH1	0C81116A	VR 10K (A)x2
CNH1	0C80857A	3P Connector Terminal
	0C80919A	Ribbon Wire (1)
	CA80245A	Remote Control P.C.B. Ass'y
QS01-05 07,08	0C81203A	Remote Control P.C.B.
RS01-05 07,08	0C80739A	TR 2SC1685
RS06	0B01889A	RK 100K 1/4W J
RS09-15	0B01888A	RK 10K 1/4W J
JS01	0B05641A	RK 47K 1/4W J
	0C80917A	8P DIN Socket

Schematic Ref. No.	Part No.	Description
	BA05498A	Pin Jack P.C.B. Ass'y
	0B60124B	Pin Jack P.C.B.
Q302	0B10025A	TR 2SC945L (P,K)
D304	0B06398A	SiD 1SS176
R119,121 219,221	0B22602A	RM 220 1/4W F
R120,220	0B22594A	RM 10K 1/4W F
R307	0B09677A	RK 1K 1/6W J
RL302	0B90038A	DS Relay 12V
	0B82341B	XH Connector 3P 700mm (1)
	0B81282A	Pin Jack 2P (1)
	CA80243A	FL Indicator P.C.B. Ass'y
	0C81197A	FL Indicator P.C.B.
FL1	0C80813A	FL Display
	CA80263A	8P Connector Cord Ass'y (1)
	CA80293A	7P Connector Cord Ass'y (1)
	CA80265A	4P Connector Cord Ass'y (1)

7.11. Headphone Amp. P.C.B. Ass'y

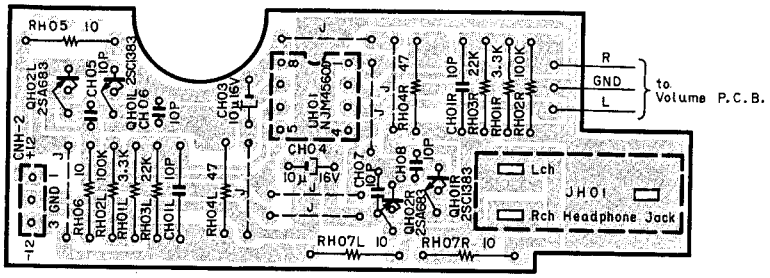


Fig. 7.11

7.12. Auto Power Control P.C.B. Ass'y

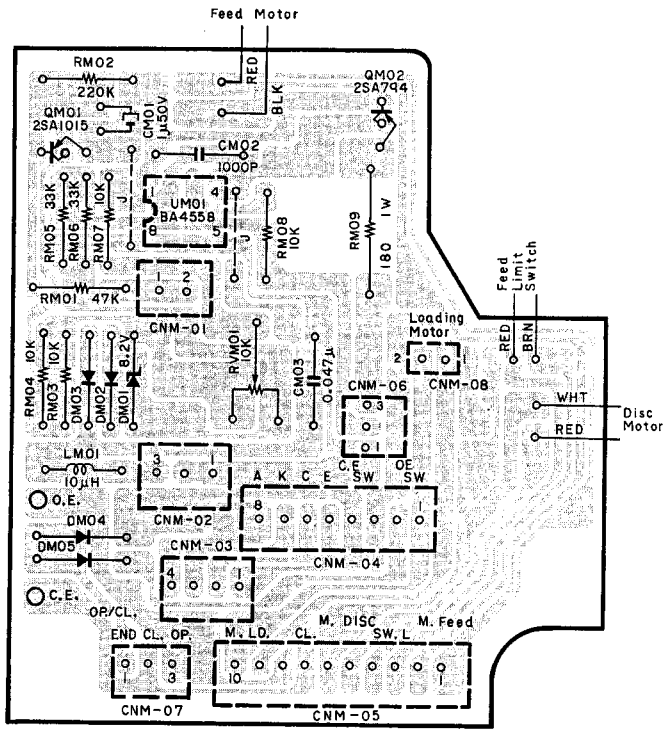


Fig. 7.12

Schematic Ref. No.	Part No.	Description
	CA80231A	Headphone Amp. P.C.B. Ass'y
	0C81198A	Headphone Amp. P.C.B.
UH01	0C81039A	IC 4560
QH01L,01R	0C81041A	TR 2SC1383
QH02L,02R	0C81040A	TR 2SA683
RH01L,01R	0B01681A	RK 3.3K 1/4W J
RH02L,02R	0B01889A	RK 100K 1/4W J
RH03L,03R	0B05615A	RK 22K 1/4W J
RH04L,04R	0B01706A	RK 47 1/4W J
RH05,06 07L,07R	0B05936A	RK 10 1/4W J
CH01L,01R	0C81043A	CC 10P 50V J
CH03,04	0B40009A	CE 10μ 16V
CH05,06 07,08	0B09077A	CC 10P 50V M
JH01	0C81042A	Headphone Jack
	CA80286A	2P Connector Cord Ass'y (1)
	CA80241A	Auto Power Control P.C.B. Ass'y
	0C81174A	Auto Power Control P.C.B.
UM01	0C80923A	IC BA4558
QM01	0C80743A	TR 2SA1015
QM02	0C80756A	TR 2SA794
DM01	0C80932A	ZD 8.2V MA1082
DM02,03 04,05	0C80877A	SiD MA150
LM01	0C80922A	RF Coil 10μH
RVM01	0C80887A	Potentiometer 10K
RM01	0B05641A	RK 47K 1/4W J
RM02	0B05625A	RK 220K 1/4W J
RM03,04 07,08	0B01888A	RK 10K 1/4W J
RM05,06	0B05509A	RK 33K 1/4W J
RM09	0C80924A	RM 180 1W J
CM01	0B40112A	CE 1μ 50V
CM02	0C80930A	CC 1000P 50V M
CM03	0B05797A	CC 0.047μ 50V Z
CNM06	0C80928A	3P Connector Terminal
CNM07	0C80929A	3P Connector Terminal
CNM08	0C80927A	2P Connector Terminal
	CA80272A	1P Connector Cord Ass'y (1)
	CA80273A	2P Connector Cord Ass'y (1)
	CA80274A	4P Connector Cord Ass'y (1)
	CA80275A	8P Connector Cord Ass'y (1)
	0C80919A	Ribbon Wire (1)

7.13. RF Pre-Amp. P.C.B. Ass'y

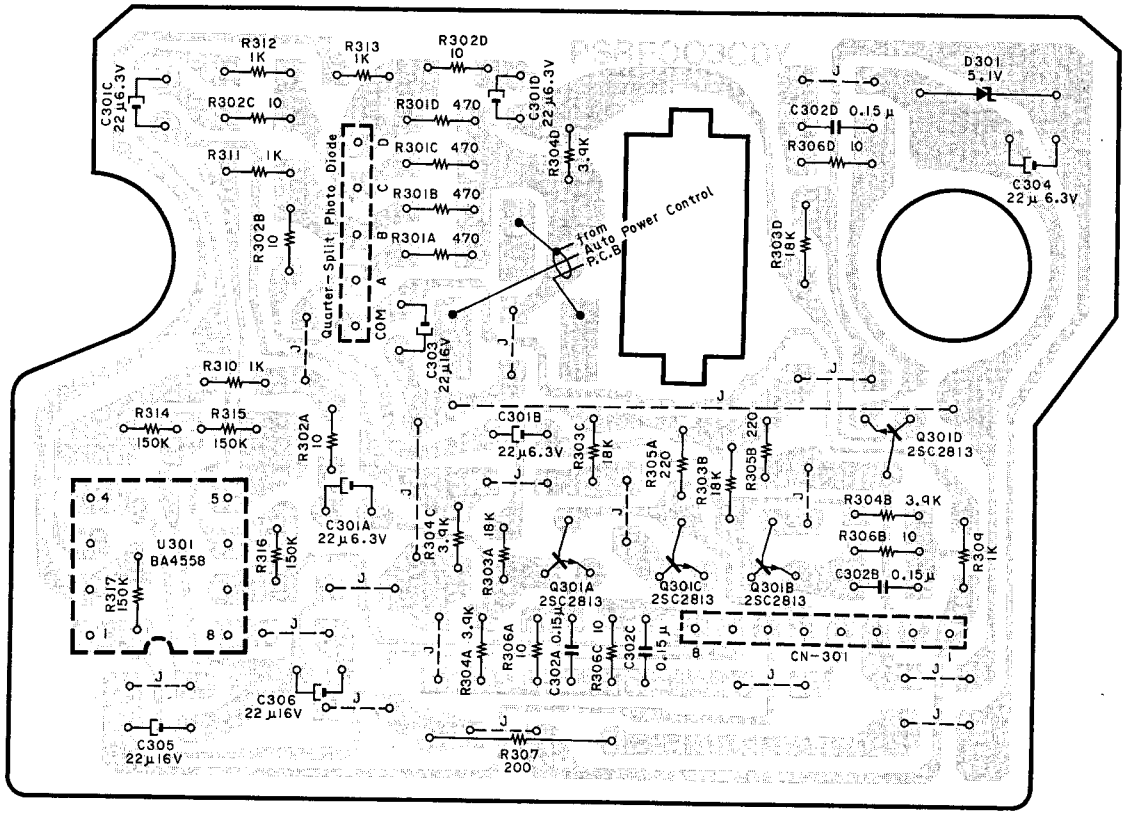


Fig. 7.13

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	CA80235A	RF Pre-Amp. P.C.B. Ass'y	C301A 301B 301C 301D,304	0B40128A	CE 22μ 6.3V
	0C81204A	RF Pre-Amp. P.C.B.			
U301	0C80923A	IC BA4558			
Q301A 301B 301C 301D	0C81067A	TR 2SC2813 (Chip)	C302A 302B 302C 302D	0C81176A	CC 0.15μ 50V K (Chip)
			C303,305 306	0B40075A	CE 22μ 16V
D301	0C80871A	ZD 5.1V RD5.1EB1	CN301	0C80875A	8P Connector
R301A 301B 301C 301D	0B23065A	RK 470 1/8W J (Chip)			Terminal
				CA80294A	Lug Ass'y (1)
R302A 302B 302C 302D 306A 306B 306C 306D	0B23025A	RK 10 1/8W J (Chip)			
R303A 303B 303C 303D	0B23103A	RK 18K 1/8W J (Chip)			
R304A 304B 304C 304D	0B23087A	RK 3.9K 1/8W J (Chip)			
R305A 305B	0B23057A	RK 220 1/8W J (Chip)			
R307	0B09660A	RK 200 1/4W J			
R309,310 311,312 313	0B23073A	RK 1K 1/8W J (Chip)			
R314,315 316,317	0B23125A	RK 150K 1/8W J (Chip)			

7.14. Power Supply P.C.B. Ass'y

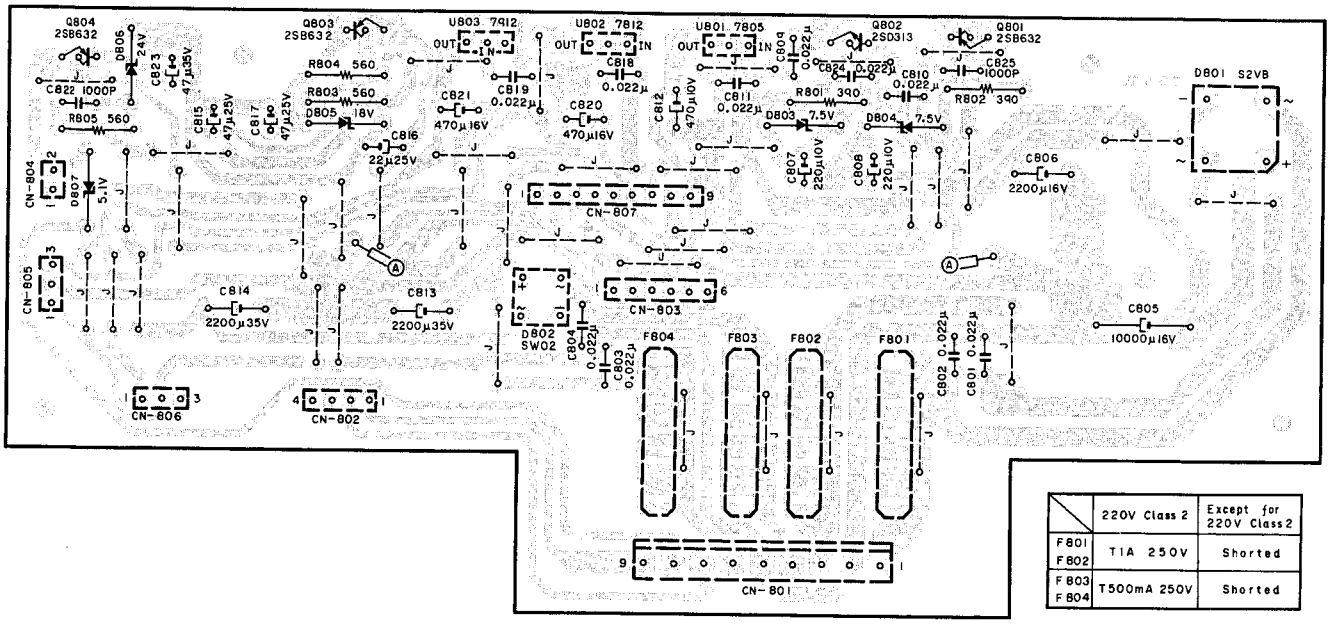


Fig. 7.14

Schematic Ref. No.	Part No.	Description
	CA80232A	Power Supply P.C.B. Ass'y
	0C81414A	Power Supply P.C.B.
U801	0B11010A	IC µPC7805H
U802	0B11011A	IC µPC7812H
U803	0B11057A	IC µPC7912H
Q801,803 804	0C80738A	TR 2SB632
Q802	0C80737A	TR 2SD313
D801	0C80849A	Diode Bridge S2VB
D802	0C80850A	Diode Bridge SW02
D803,804	0C80863A	ZD 7.5V MA1075
D805	0C81068A	ZD 18V MA1180
D806	0C80864A	ZD 24V MA1240
D807	0C80862A	ZD 5.1V MA1051
R801,802	0B05691A	RK 390 1/4W J
R803,804 805	0B05575A	RK 560 1/4W J
C801,802 803,804 809,810 811,818 819,824	0B09291A	CC 0.022µ 50V Z
C805	0B40233A	CE 10000µ 16V
C806	0B40083A	CE 2200µ 16V
C807,808	0B05899A	CE 220µ 10V
C812	0B40067A	CE 470µ 10V
C813,814	0B40109A	CE 2200µ 35V
C815,817	0B40036A	CE 47µ 25V
C816	0B40088A	CE 22µ 25V
C820,821	0B40081A	CE 470µ 16V
C822,825	0B09288A	CC 1000P 50V K
C823	0B40103A	CE 47µ 35V
CN801	0C80859A	9P Connector Terminal
CN802	0C80858A	4P Connector Terminal
CN803	CA80292A	6P Connector Cord Ass'y
CN804	0C80856A	2P Connector Terminal
CN805,806	0C80857A	3P Connector Terminal
CN807	CA80267A	9P Connector Cord Ass'y
	0C80847A	Heat Sink A (1)
	0C80848A	Heat Sink B (1)
	0C80854A	Insulator (1)
	0B08347U	Fuse T1A 250V (2) (220V Class 2)
	0B08457A	Fuse T500mA 250V (220V Class 2) (2)

Schematic Ref. No.	Part No.	Description
	CA80244A	Control Switch P.C.B. Ass'y
	0C81181A	Control Switch P.C.B.
UK01	0C80752A	IC µPC1474HA
QK01	0C80739A	TR 2SC1685
LDK01	0C80753A	Photo Diode PH302
LDK02,03 04	0C80755A	LED 1301
LDK05	0C80754A	LED G555
DK01	0C80877A	SiD MA150
LK01,02	0C81151A	Coil 5.6mH
RK01	0B01857A	RK 1K 1/4W J
RK02	0B09629A	RK 10 1/6W JV
RK03	0B09701A	RK 10K 1/6W JV
RK04,07	0B01888A	RK 10K 1/4W J
RK05	0B09645A	RK 47 1/6W J
RK06	0B01679A	RK 100 1/4W J
RK08	0B05579A	RK 22 1/4W J
RK09,10 11	0B01706A	RK 47 1/4W J
CK01,02, 08	0C81177A	CE 10µ 6.3V
CK03,05	0B09166A	CM 3300P 50V M
CK04	0B41292A	CF 0.033µ 50V
CK06	0B40049A	CE 100µ 6.3V
CK07	0B05638A	CT 1µ 35V
	CA80270A	9P Connector Cord Ass'y (1)
	CA80268A	2P Connector Cord Ass'y (1)
	CA80269A	4P Connector Cord Ass'y (1)
	0C80908A	Key Switch B3F-1022 (1)
	0C80907A	Key Switch B3F-1020 (22)
	0C80909A	LED Holder S (1)
	0C80910A	LED Holder W (1)
	0C81207A	Shield Case (1)
	BA05494A	Analog Processor P.C.B. Ass'y
	0B60122A	Analog Processor P.C.B.
IC101,201 301	0B11155A	IC LF353N

Schematic Ref. No.	Part No.	Description
Q101,201	0B06299A	TR 2SC2878
Q102,202	0B06142A	TR 2SC2240 (BL)
Q103,203	0B10050A	TR 2SA970 (BL)
Q301	0B10025A	TR 2SC945L (P,K)
ZD101,102 201,202	0B12128A	ZD 10V RD10JSB2
D301,302 303	0B06398A	SiD 1SS176
R101,201	0B22585A	RM 887 1W F
R102,108 202,208	0B22588A	RM 23.7K 1/2W F
R103,203	0B22592A	RM 2.21K 1/4W F
R104,204	0B22593A	RM 8.25K 1/4W F
R105,106 205,206	0B22590A	RM 1M 1/2W G
R107,207	0B22587A	RM 8.25K 1/2W F
R109,110 111,209 210,211	0B22595A	RM 51.1K 1/4W F
R112,212	0B22596A	RM 100K 1/4W F
R113,114 115,213 214,215	0B22597A	RM 300K 1/4W G
R116,216	0B22589A	RM 100K 1/2W F
R117,118 217,218	0B22591A	RM 1K 1/4W F
R301,306	0B09677A	RK 1K 1/6W J
R302,303	0B09725A	RK 100K 1/6W J
R304,305	0B09741A	RK 470K 1/6W J
C101,201	0B41195A	CM 4700P 100V G
C102,202	0B41194A	CM 0.01µ 100V K
C103,203	0B09247A	C 220P 50V J
C104,204 301	0B09903A	CE 2.2µ 50V (KS)
C105,205	0B41196A	CM 470P 160V J
C106,206	0B41198A	CM 1800P 160V J
C107,207	0B41197A	CM 1200P 160V J
C108,208	0B41199A	CM 0.047µ 100V K
C109,209	0B41192A	CM 1µ 100V K
C110,111 210,211	0B41193A	CM 0.22µ 100V K
C112,113 212,213	0B41200A	C 47P 500V J
RL301	0B90038A	DS Relay 12V
	0B82338B	XH Connector 3P 480mm (1)
	0B82339B	EH Connector 4P 450mm (1)
	0B82340A	XH Connector 3P 570mm (1)
	0B82116B	Ribbon Cable 2P 160mm (2)
	0B82345A	Ribbon Cable 2P 120mm (2)

7.15. Control Switch P.C.B. Ass'y

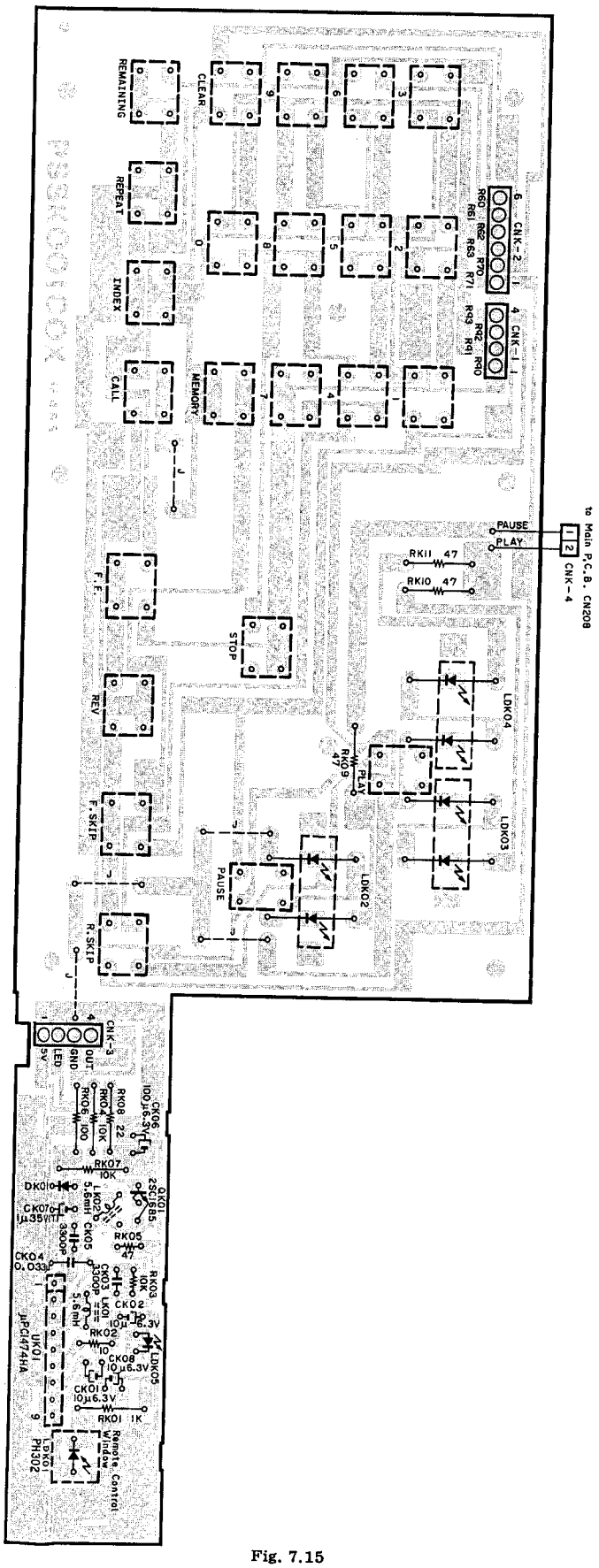


Fig. 7.15

7.16. Analog Processor P.C.B. Ass'y

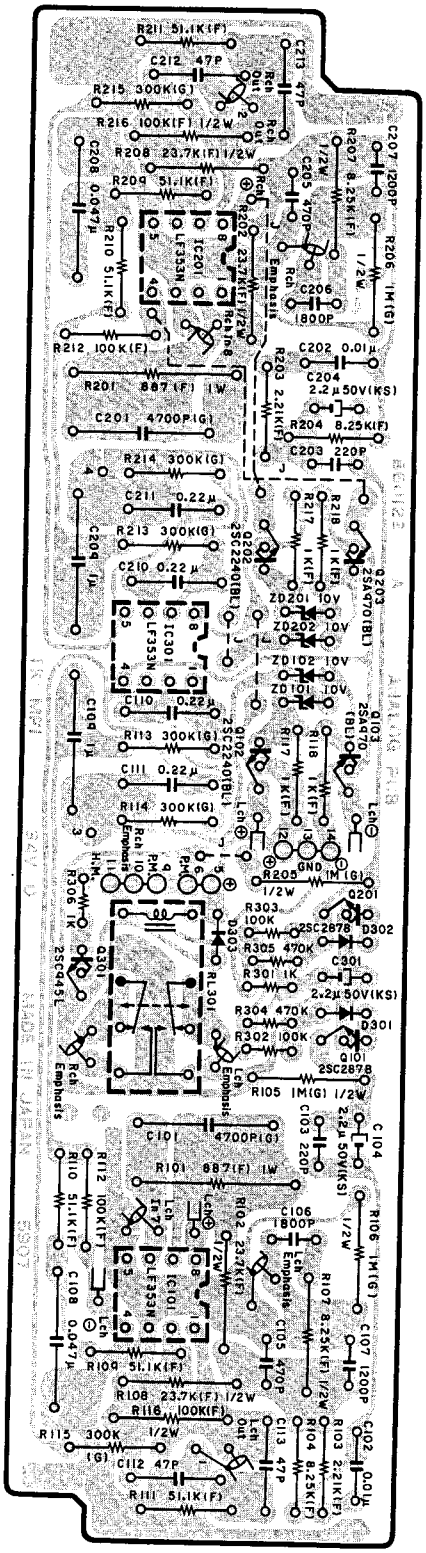


Fig. 7.16

7.17. D/A Converter P.C.B. Ass'y

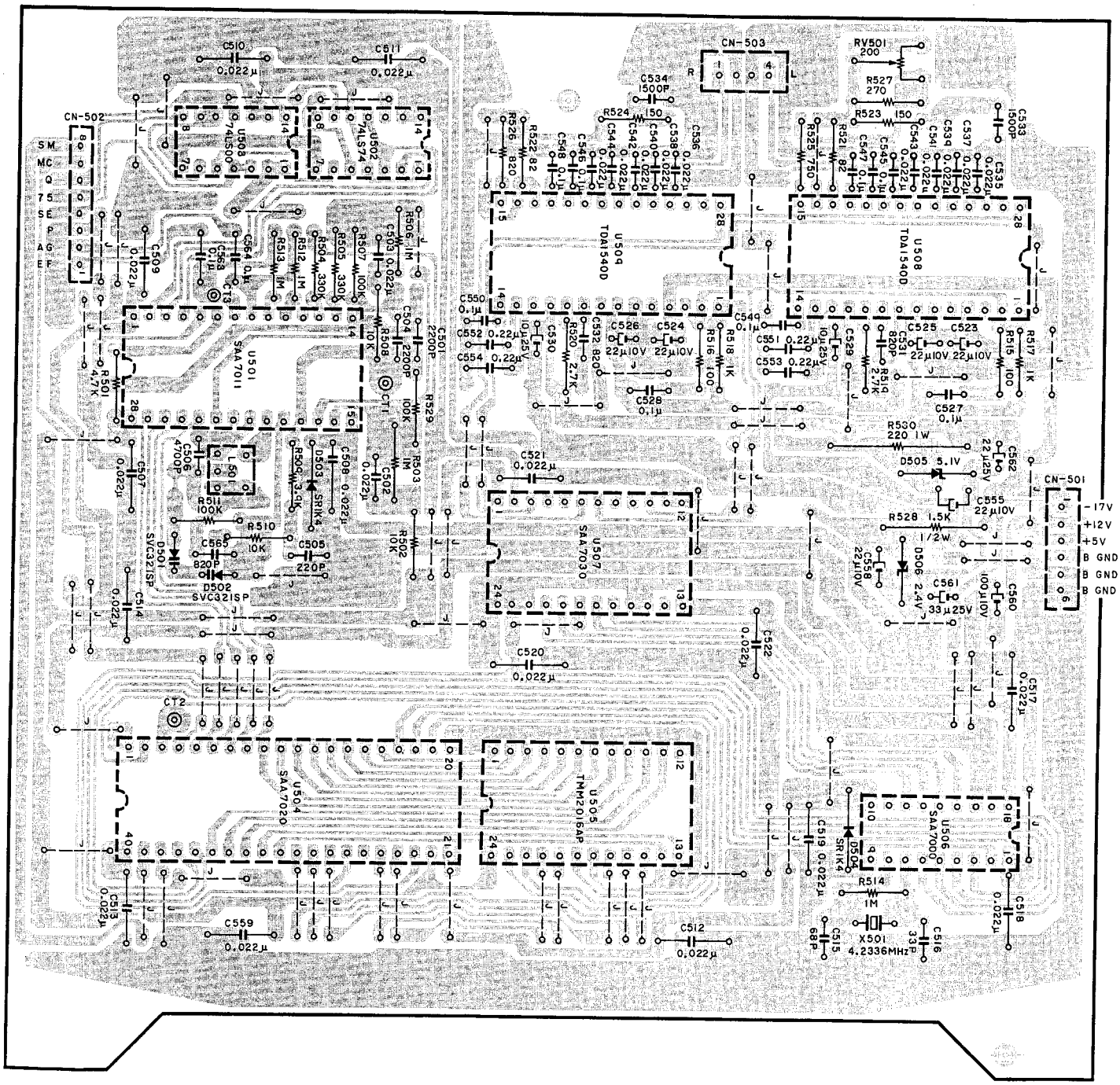


Fig. 7.17

Schematic Ref. No.	Part No.	Description
	CA80233A	**D/A Converter P.C.B. Ass'y**
	0C81194A	D/A Converter P.C.B.
U501	0C80727A	IC SAA7011
U502	0C80828A	IC 74LS74
U503	0C80827A	IC 74LS00
U504	0C80728A	IC SAA7020
U505	0C80749A	IC TMM2016P-2
U506	0C80730A	IC SAA7000
U507	0C80729A	IC SAA7030
U508,509	0C80731A	IC TDA1540D
D501,502	0C80823A	Varicap SVC321SP
D503,504	0C80824A	SiD SR1K4
D505	0C80826A	ZD 5.1V
D506	0C80825A	ZD 2.4V
X501	0C80834A	Crystal 4.2336 MHz
L501	0C80833A	VCO Coil
RV501	0C80832A	Potentiometer 200
R501	0B01846A	RK 4.7K 1/4W J
R502,508 510	0B01888A	RK 10K 1/4W J
R503,506 512,513 514	0B05776A	RK 1M 1/4W J
R504,505	0B05627A	RK 330K 1/4W J
R507,511 529	0B01889A	RK 100K 1/4W J
R509	0B05675A	RK 3.9K 1/4W J
R515,516	0B01679A	RK 100 1/4W J
R517,518	0B01857A	RK 1K 1/4W J
R519,520	0B05629A	RK 2.7K 1/4W J
R521,522	0B05631A	RK 82 1/4W J
R523,524	0B05795A	RK 150 1/4W J
R525	0B09924A	RK 750 1/4W J
R526	0B01680A	RK 820 1/4W J
R527	0B05645A	RK 270 1/4W J
R528	0C80830A	RM 1.5K 1/2W J
R530	0C80831A	RM 220 1W J
C501,504	0B04060A	CM 2200P 50V K
C502,503	0B41098A	CM 0.022μ 63V
C505	0B09247A	CM 220P 50V J
C506	0B05652A	CM 4700P 50V J
C507-514 517-522 559	0C80805A	CC 0.022μ 50V M (15)
C515	0C80838A	CC 68P 50V J
C516	0C81189A	CC 33P 50V J
C523,524 525,526	0C81178A	CE 22μ 10V
C527,528 545-550 563,564	0B41537A	CM 0.1μ 100V J (10)
C529,530	0C80802A	CE 10μ 25V
C531,532	0B09993A	CM 820P 50V J
C533,534	0B05653A	CM 1500P 50V J
C535-544	0B41098A	CM 0.022μ 100V J (10)
C551,552 553,554	0B41176A	CM 0.22μ 63V J
C555,558	0B40159A	CE 22μ 10V
C560	0B40063A	CE 100μ 10V
C561	0B40076A	CE 33μ 25V
C562	0B40088A	CE 22μ 25V
C565	0C80804A	CC 820P 50V K
CN501	0C80836A	6P Connector Terminal
CN502	0C80837A	8P Connector Terminal
CN503	0C81134A	4P Connector Terminal
CT1,2,3	0C80829A	Test Pin

Schematic Ref. No.	Part No.	Description
	CA80246A	Main P.C.B. Ass'y
	0C81196A	Main P.C.B.
U101,102	0C80740A	IC TA7302P
103		
U104	0C80880A	IC SN74LS04N
U105,106	0C80923A	IC BA4558
107,108		
110		
U109	0C80732A	IC BA547
U111	0C80733A	IC BA6208
U112	0C80734A	IC HD4053BP
U113	0B06178A	IC μPD4011BC
U114	0B06215A	IC TC4049BP
U115	0B06214A	IC μPD4071BC
U116	0C80736A	IC HMCS404C
U117	0C80735A	IC HMCS402C
Q101,102	0C80741A	TR 2SC1675
103,104		
Q105,106	0C80739A	TR 2SC1685
113,114		
121,122		
304		
Q107,109	0C80742A	TR 2SC1815
131,302		
Q108,110	0C80743A	TR 2SA1015
128,301		
303		
Q111,112	0C80744A	FET 2SK136
Q115,118	0C80745A	FET 2SK246
120		
Q116	0C80750A	TR 2SC3422
Q117	0C80751A	TR 2SA1359
Q119,123	0C80747A	TR 2SA564
126,129		
130		
Q124	0C80746A	TR 2SC1449
Q125	0C80738A	TR 2SB632
Q127	0C80748A	TR 2SC1384
D101-114	0C80877A	SiD MA150 (43)
116-129		
134		
136-146		
301,305		
306		
D115,133	0C80902A	ZD 4.7V MA1047
135		
D131,132	0C80824A	SiD SR1K4
D147	0C80863A	ZD 7.5V MA1075
CX101	0C81179A	Crystal 4MHz
T101,102	0C80876A	Pulse Transformer
RV101,106	0C80887A	Potentiometer 10K
107,108		
RV102,105	0C80888A	Potentiometer 2K
RV103	0C80886A	Potentiometer 1K
RV104	0C80889A	Potentiometer 5K
RV109,110	0C80890A	Potentiometer 50K
R101	0B05936A	RK 10 1/4W J
R102,104	0B05622A	RK 2.2K 1/4W J
145,147		
148,185		
218,226		
R103,132	0B05576A	RK 470 1/4W J
133,136		
137		
R105,106	0C81130A	RK 1.1K 1/4W J
R107,108	0B05509A	RK 33K 1/4W J
R109,110	0B09075A	RK 30K 1/4W J
240,250		
308		
R111,112	0B05795A	RK 150 1/4W J
123,125		
R113,114	0B05645A	RK 270 1/4W J
115,116		
R117	0B09272A	RK 910 1/4W J
R118,119	0B01857A	RK 1K 1/4W J
122,128		
134,135		
146,170		
172,200		
244,291		
295,315		
R120,121	0B01681A	RK 3.3K 1/4W J
290		
R124	0B05868A	RK 680K 1/4W J
R126,152	0B09301A	RK 2K 1/4W J
154		
R127,131	0B01706A	RK 47 1/4W J
253,259		

Schematic Ref. No.	Part No.	Description
R129,165	0B05641A	RK 47K 1/4W J
171,179		
212,242		
260,275		
277,278		
280,304		
R130,191	0B01846A	RK 4.7K 1/4W J
194,216		
239,302		
305,311		
R138,166	0B09388A	RK 5.1K 1/4W J
R139,140	0B01888A	RK 10K 1/4W J
149,150		
186,211		
214,221		
223,261		
262,265		
266,296		
301,303		
309,310		
R141,142	0B01889A	RK 100K 1/4W J
222,225		
228,273		
276,282		
283,284		
314		
R143,144	0B01679A	RK 100 1/4W J
175,180		
227,254		
R151,153	0B09509A	RK 20K 1/4W J
241,245		
R161	0B05621A	RK 120K 1/4W J
R162,164	0B01683A	RK 15K 1/4W J
230,231		
R163	0B09369A	RK 62K 1/4W J
R167	0B09307A	RK 4.3K 1/4W J
R169,178	0B01682A	RK 6.8K 1/4W J
R173	0B05694A	RK 9.1K 1/4W J
R174	0B05626A	RK 150K 1/4W J
R176	0B01854A	RK 39K 1/4W J
R177,229	0B09183A	RK 7.5K 1/4W J
294		
R181	0B05784A	RK 560K 1/4W J
R182	0B09320A	RK 820K 1/4W J
R183	0B05627A	RK 330K 1/4W J
R184,213	0B05776A	RK 1M 1/4W J
279,293		
R187,188	0B09392A	RK 200K 1/4W J
R189	0B05560A	RK 18K 1/4W J
R190	0B05626A	RK 150K 1/4W J
R192,193	0B05967A	RK 300 1/4W J
233,234		
R195,196	0B05695A	RK 1 1/4W J
312,313		
R197,198	0B09753A	RK 4.7 1/4W J
R199,251	0B05698A	RK 1.5K 1/4W J
R215	0B09924A	RK 750 1/4W J
R217,220	0B09548A	RK 24K 1/4W J
R219,224	0B05876A	RK 51K 1/4W J
285		
R232,235	0B05675A	RK 3.9K 1/4W J
R236	0B05575A	RK 560 1/4W J
R237,238	0C81131A	RK 0.5 1/4W J
R243	0B05640A	RK 180K 1/4W J
R246	0B09826A	RK 3K 1/4W J
R247	0B01887A	RK 5.6K 1/4W J
R248	0B09556A	RK 3.6K 1/4W J
R249,256	0B05625A	RK 220K 1/4W J
258,267		
268,270		
271,272		
306		
R252	0B01684A	RK 470K 1/4W J
R255,257	0B09925A	RK 2.2 1/4W J
R263,292	0B05688A	RK 390 1/4W J
R269	0B05615A	RK 22K 1/4W J
R274	0B09072A	RK 110K 1/4W J
R281	0C81132A	RK 91 1/4W J
R316,317	0B09784A	RK 3.3M 1/4W J
C101,104	0B40009A	CE 10μ 16V
105,110		
113,118		
119,123		
135,136		
151,169		
185,186		
196,197		
206,214		
215,303		

Schematic Ref. No.	Part No.	Description
C102,103	0B40278A	CT 1μ 16V
C106,107	0C80805A	CC 0.022μ 50V M
108,111		
112,114		
122,124		
132,143		
148,164		
165,168		
171,172		
176,178		
180,181		
182,183		
187,189		
191,198		
207,209		
213		
C109,115	0B40112A	CE 1μ 50V
130,184		
204		
C116,117	0C81182A	CC 0.015μ 50V M
C120	0C81184A	CC 100P 50V J
C121	0B40023A	CE 0.22μ 50V
C125,129	0C81183A	CC 0.01μ 50V M
177,217		
C126,131	0C81186A	CC 220P 50V K
C127,128	0C81192A	CC 47P 50V J
133,134		
C137,138	0C81190A	CC 4.7μ 50V K
C139,140	0C81185A	CC 1500P 50V M
C141,142	0B40165A	CE 47μ 16V
C145,202	0B41094A	CM 0.01μ 100V J
203		
C146	0B04060A	CM 2200P 50V K
C147	0B09189A	CM 2700P 50V J
C149	0B41373A	CM 0.068μ 100V J
C150	0C81188A	CC 3300P 50V M
C161,190	0C80930A	CC 1000P 50V M
212		
C162	0C81193A	CC 680P 50V K
C163	0C81184A	CC 100P 50V J
C166,167	0B40063A	CE 100μ 10V
C170	0C81191A	CC 470P 50V K
C173	0B40199A	CE 1μ 50V (BP)
C174,210	0B40240A	CE 0.47μ 50V (BP)
C175	0B40246A	CE 10μ 16V (BP)
C179,199	0C81205A	CE 0.1μ 50V (LN)
C192	0B40020A	CE 10μ 35V
C193	0B40013A	CE 3.3μ 25V
C194,195	0C81189A	CC 33P 50V J
C200	0B41175A	CM 0.15μ 63V
C201	0B05659A	CM 5600P 100V
C205	0B40243A	CE 4.7μ 25V (BP)
C208	0C81187A	CC 2700P 50V M
C211	0B40238A	CE 0.22μ 50V (BP)
C216	0B40008A	CE 47μ 10V
C218	0B40009A	CE 10μ 16V
C301	0B05898A	CE 0.15μ 50V
C302	0B40115A	CE 4.7μ 50V
CN201,210	0C80837A	8P Connector Terminal
211		
CN202,216	0C81173A	9P Connector Terminal
CN203,208	0C80856A	2P Connector Terminal
209,217		
CN204,207	0C80857A	3P Connector Terminal
CN205	0C80836A	6P Connector Terminal
CN206,214	0C80858A	4P Connector Terminal
CN212	0C81172A	7P Connector Terminal
CN213	0C81413A	5P Connector Terminal
CN215	0C81133A	11P Connector Terminal
CN217	0C81161A	2P Connector Terminal

7.18. Main P.C.B. Ass'y

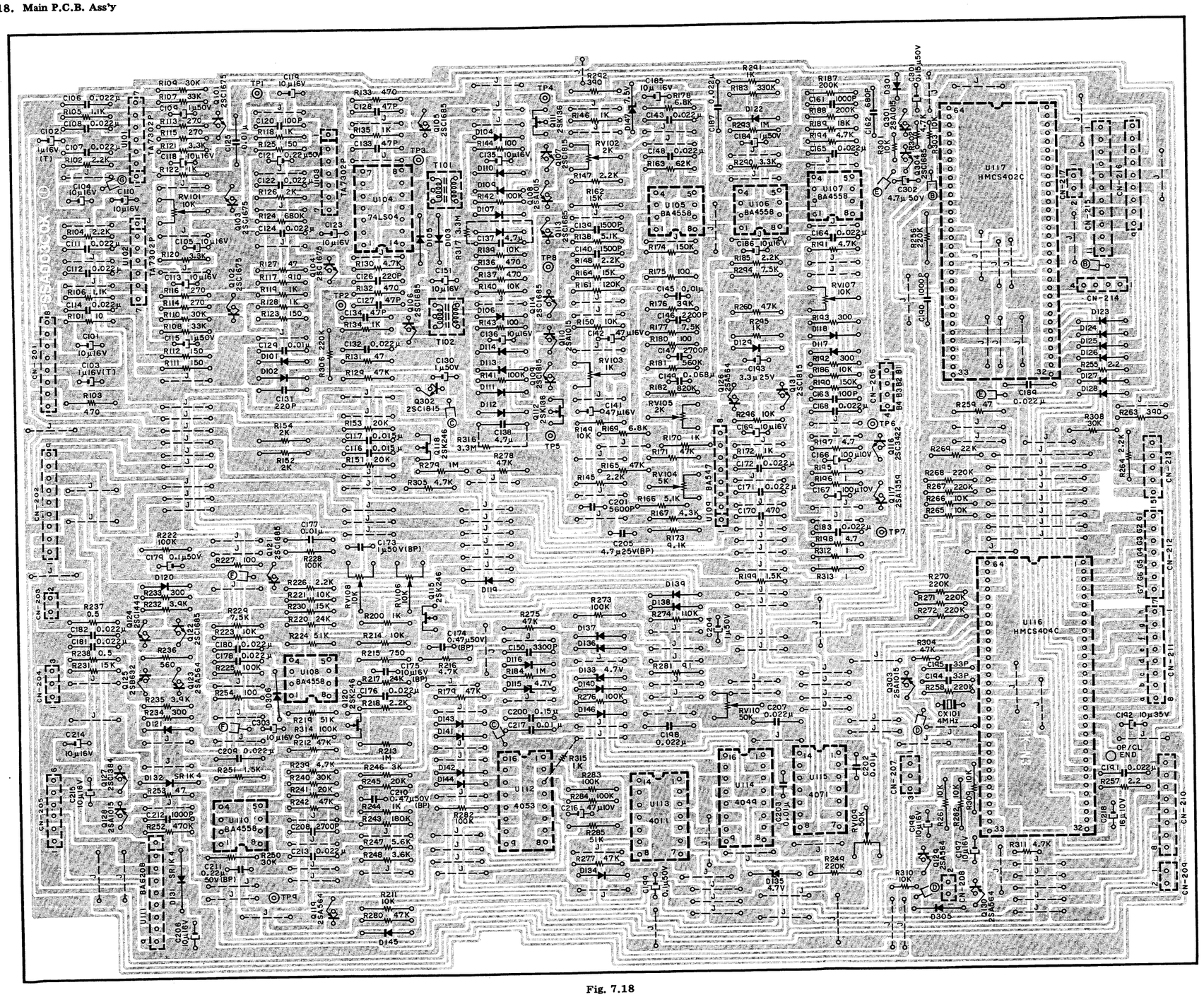


Fig. 7.18

8. SCHEMATIC DIAGRAM

8.1. IC Block Diagrams and Descriptions

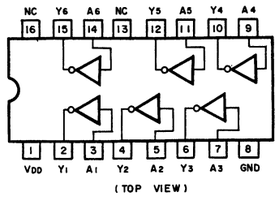


Fig. 8.1.1 Inverter C-MOS IC TC4049BP

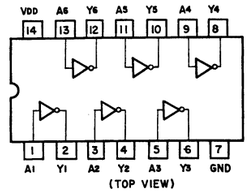


Fig. 8.1.2 Inverter TTL IC 74LS04

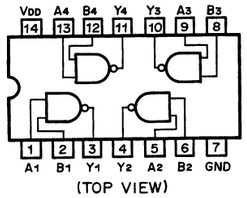


Fig. 8.1.3 NAND Gate C-MOS IC μPD4011BC

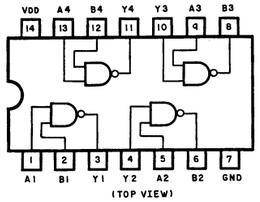


Fig. 8.1.4 NAND Gate TTL IC 74LS00

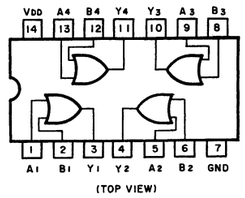


Fig. 8.1.5 OR Gate C-MOS IC μPD4071BC

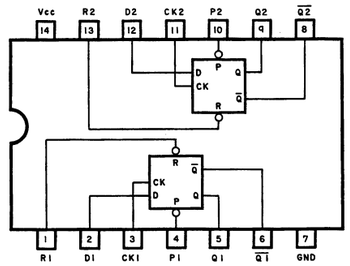


Fig. 8.1.6 D-Type Flip-Flop TTL IC 74LS74

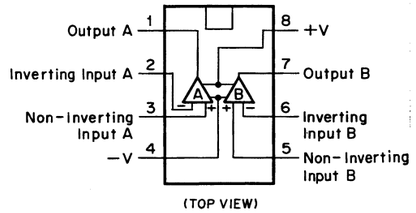


Fig. 8.1.7 Operational Amp. IC BA4558, LF353N, 4560

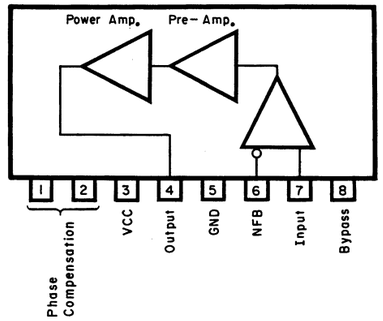


Fig. 8.1.18 D/A Converter IC TDA1540D

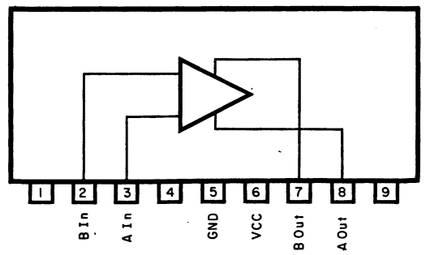


Fig. 8.1.9 Motor Driver BA6208

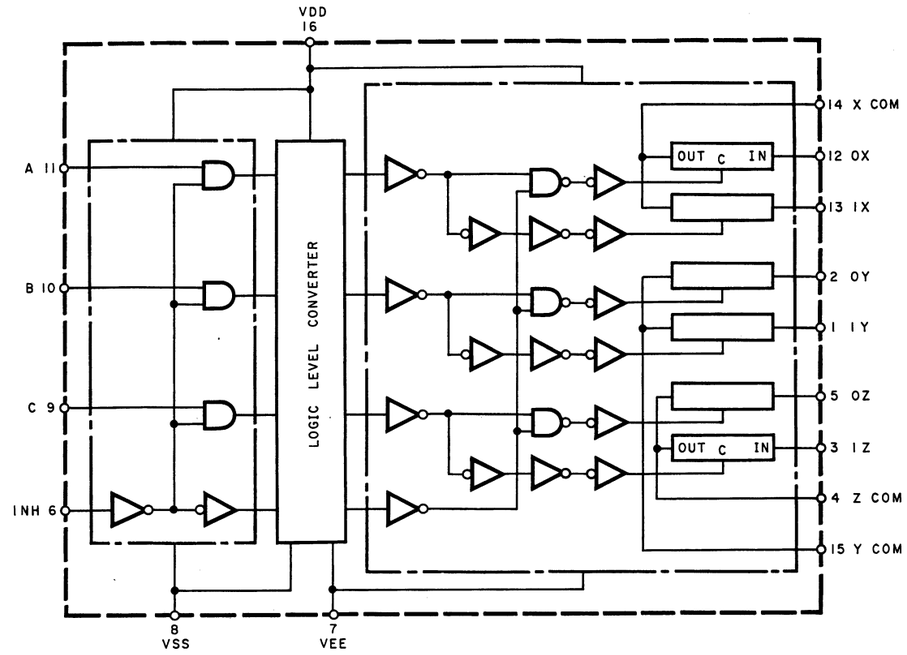


Fig. 8.1.10 Analog Switch HD4053BP

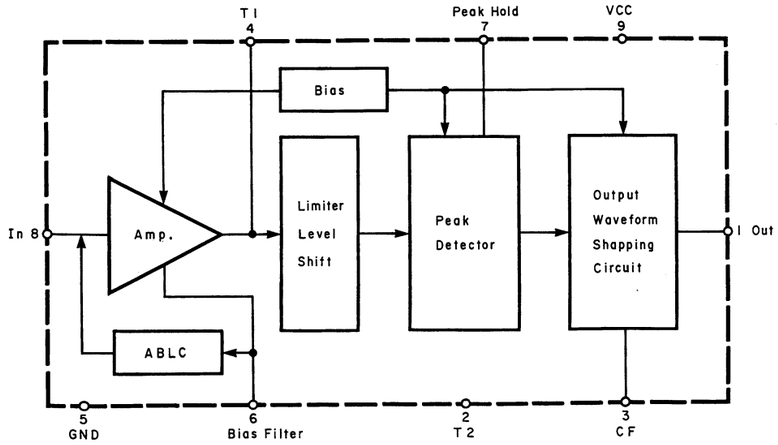


Fig. 8.1.11 Pre-Amp. IC μPC1474HA

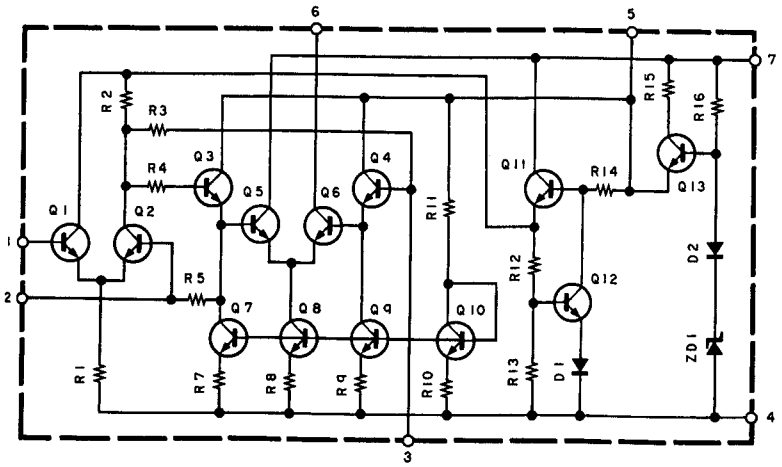
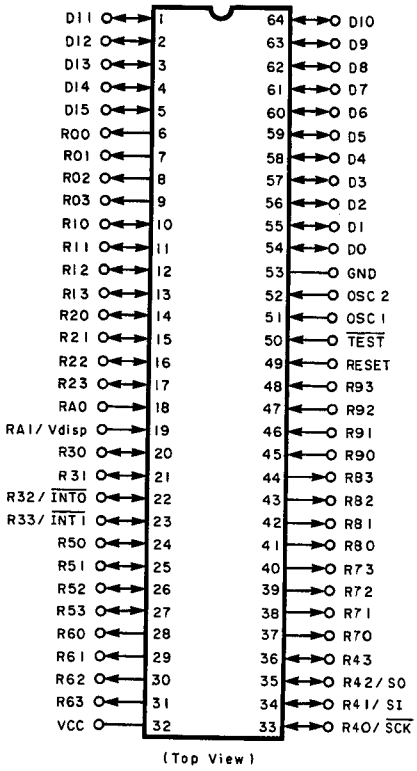


Fig. 8.1.12 RF IF Amp. TA7302P



OSC1, OSC2:	**Crystal Input for Internal Oscillator**
Test:	**Test**
Reset:	**Reset**
INT0, INT1:	**Interrupt**
SCK, SI, SO:	**Serial Interface**
D0-15:	**Bidirectional Ports**
R00-03, 60-63, 70-73, 80-83:	**Output Ports**
R10-13, 20-23, 30-33, 40-43, 50-53:	**Bidirectional Ports**
R90-93, RA0, RA1:	**Input Ports**

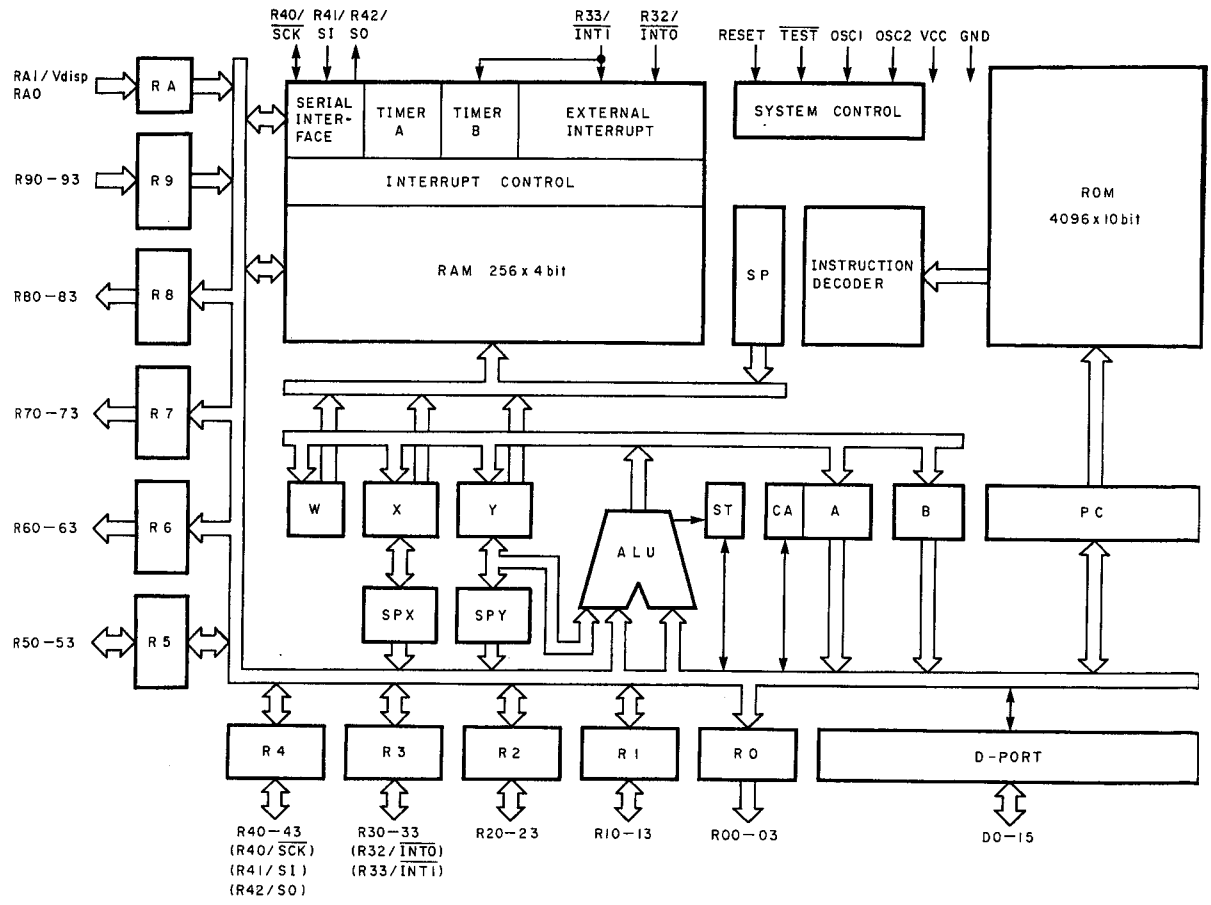


Fig. 8.1.13 Micro Processor HMCS404C/402C

Description of Demodulator IC U501 (SAA7011)
(See Figs. 8.1.14 — 8.1.16.)

Pin Description of Demodulator IC:

Pin No.	Signal Name	In/ Out	Description
1	VBB	In	—2.5 V. Back bias supply.
2	SDATA	Out	Push-pull output for subcoding data. An 8 bit burst of data (including a 1 bit subcoding frame sync) is output serially once per frame coincident with SBCL.
3	SBCL	Out	Push-pull output for subcoding bit clock. An 8 bit burst clock at nominally 2.1609 MHz which is used to synchronize the subcoding data.
4	SWCL	Out	Push-pull output for subcoding word clock. A square wave signal at data frame rate (7.35 kHz) used to synchronize the subcoding words and the pause (P) bit.
5	P	Out	Push-pull output for the subcoding pause bit. This signal is derived from the encoded subcoding word and is used to indicate a music pause. A debounce circuit is incorporated to eliminate erroneous data.
6	HFD	In	Input from external high frequency detector. When this signal is high the frequency detector output (FD) and phase detector are enabled. (This input is kept High.)
7	HFI	In	Non-inverting input to the level detector. A differential signal of between 0.5 V and 2.5 V peak-peak is required between pins 7 and 8 to drive the level detector correctly.
8	$\overline{\text{HFI}}$	In	Inverting input to the level detector.
9	$\overline{\text{FB}}$	Out	Inverted feedback output from the level detector. These outputs ($\overline{\text{FB}}$ and FB) have a nominal impedance of 10 kΩ and will default to 1/2 VDD1 when a dropout is sensed.
10	FB	Out	Non-inverted feedback output from the level detector (see $\overline{\text{FB}}$).
11	DEFM	Out	Push-pull output for EFM (Eight-to-Fourteen Modulation) data after it has passed through the level detector. (This pin is not used.)
12	PD2	Out	Phase detector output signal. These outputs (PD1 and PD2) have a nominal impedance of 10 kΩ and the differential DC content of the signals is a measure of the phase difference between the data and the internal 4.3218 MHz clock.
13	PD1	Out	Phase detector reference signal. (see PD2.)
14	VSSD	—	Digital ground. Main ground terminal.
15	VDD2	In	+12 V supply.
16	OA1	In	Non-inverting input to the operational amplifier.
17	OA2	In	Inverting input to the operational amplifier.
18	OA3	Out	Source follower output of the operational amplifier.
19	VSSA	—	Analog ground. Ground terminal for operational amplifier only. Connected internally to VSSD via a nominal 25 Ω resistor.
20	VCO1	In	Input to voltage controlled oscillator amplifier. The amplifier is a simple inverter designed for up to 10 MHz operation. The frequency control is achieved via an external "Varicap" tuned circuit.
21	VCO2	Out	Output from voltage controlled oscillator amplifier. The load for the inverting transistor may be turned off for test purposes by reducing VDD2 to 0 V.
22	$\overline{\text{CEFM}}$	Out	A push-pull output from the internal 4.3218 MHz clock generator. (This pin is not used.)
23	FD	Out	Three state push-pull output from the frequency detector. This output has a nominal 1 kΩ impedance when active but assumes a high impedance state once the system is in lock.
24	FSDE	Out	Push-pull output for frame sync signal to the Error Corrector IC U504. A positive going pulse occurring at the end of each data frame (nominal frequency 7.35 kHz).
25	$\overline{\text{SSDE}}$	Out	Push-pull output for symbol sync signal to the Error Corrector IC U504. A negative going pulse occurring during the last bit of each data symbol (nominal frequency 254 kHz).
26	$\overline{\text{CLDE}}$	Out	Push-pull output for data bit clock to the Error Corrector IC U504. An 8 bit burst clock at nominally 2.1609 MHz which is used to synchronize the data to U504.
27	DADE	Out	Push-pull output for data to the Error Corrector IC U504. Serial data consisting of 32 x 8 bit symbols per frame which is synchronized to $\overline{\text{CLDE}}$.
28	VDD1	In	+5 V supply.

General Description of Demodulator IC:

The SAA7011 Demodulator IC forms the front-end of the compact disc digital audio decoding system, supplying demodulated data and timing signals to the Error Corrector SAA7020 and the subcoding microprocessor.

The detected signal from the disc is amplified and filtered externally and then converted to a digital signal via the level detector. This is an adaptive data slicer which relies on the nature of the modulation system to determine the optimum slicing level.

A frequency detector and a phase detector provide the coarse and fine control signals for the phase locked loop (PLL) system. The gain is supplied by an internal operational amplifier which drives a voltage controlled oscillator (VCO) running at twice the input data rate which is nominally 4.3218 MHz. The oscillator output is divided by 2 within the main clock generator which then clocks the input shift register and the timing chain. This clock signal completes the PLL loop when it is compared with the incoming data in the phase detector.
After the phase detector the data is clocked into the 23 bit input shift register to enable the frame sync pattern to be detected. Also, a minimum and maximum data length detector provides frequency limit signals (Tmin and Tmax) for the frequency detector.

The frame sync signal is used to reset the ÷588 slave-counter which, together with a ÷17 symbol rate counter, supplies timing signals for clocking the Eight-to-Fourteen Modulation (EFM) decoder and the subcoding outputs. The data is read from the input shift register in symbols of 14 bits which are latched and then decoded into 8 bit data words. The subcoding part consists of only one word per frame (see Fig. 8.1.15), therefore the output (SDATA) is a burst of 8 bits of data accompanied by a 2.1609 MHz burst clock signal (SBCL) (see Fig. 8.1.16). One bit of this subcoding output data is replaced by a subcoding frame sync bit (SF) which is decoded from either of two special EFM codes. The displaced bit is known as the Pause or P bit and is latched to its own output via a debounce circuit to remove erroneous changes.

The ÷588 slave counter also provides a sync coincidence pulse which occurs when two detected sync pulses are precisely one frame length apart (588 clock cycles). This is used by the lock indication counter as an "in-lock" signal to reset the counter and disable the frequency detector output (FD). If the system goes out of lock for any reason and the sync pulses cease then the lock indication counter will count frame periods and after 63 frames will enable the frequency detector output.

The sync coincidence pulse is also used via a delay line to reset the protected ÷588 master counter. The counter is prevented from accidental reset by erroneous sync patterns by accepting only coincident sync pulses or sync pulses which occur during a predetermined "window" at the beginning of each frame. This window is wide enough to allow for PLL bit slips, but narrow enough to avoid false sync signals generated by corrupt data.

The ÷588 master counter, together with a second ÷17 symbol rate counter, is used to time the data and clock signals to the Error Corrector SAA7020 (see Fig. 8.1.16). In this way, even if the data has been corrupted, the timing signals are correct and only re-synchronized after a complete frame has been sent to the Error Corrector.

The data to the Error Corrector (DADE) consists of 32 x 8-bit symbols per frame with half bit gaps between each symbol and a much longer gap during the frame sync period. It is this longer gap that will change in length when corrupt data upsets the timing system.

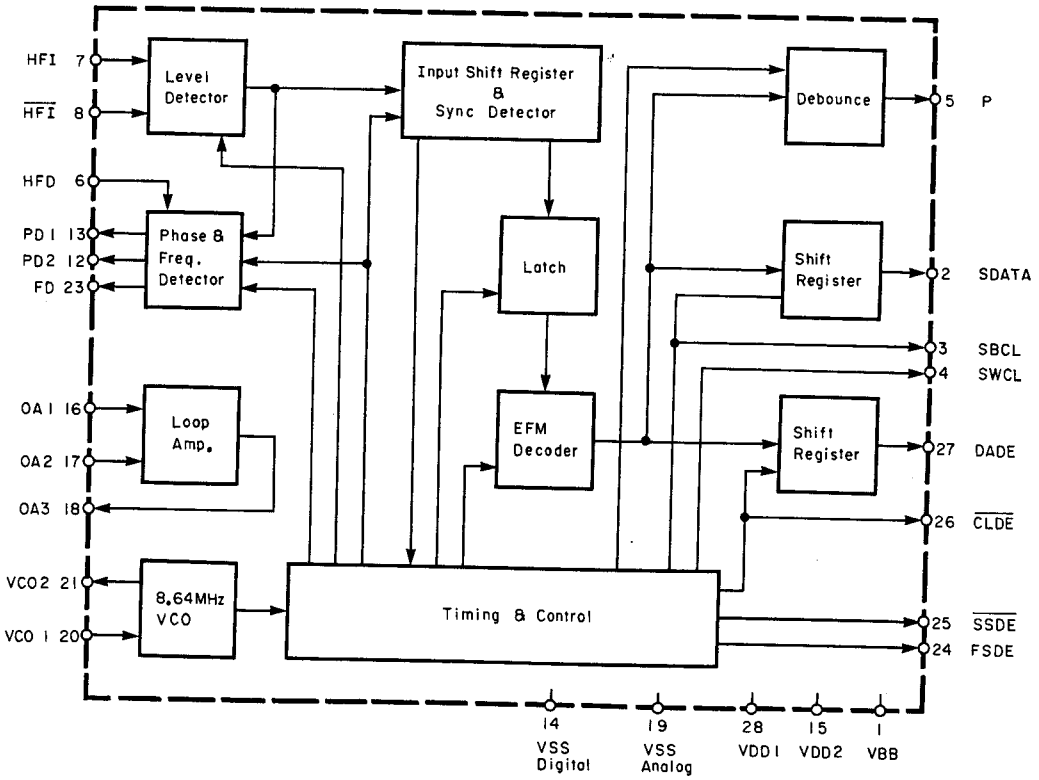


Fig. 8.1.14 Demodulator IC SAA7011

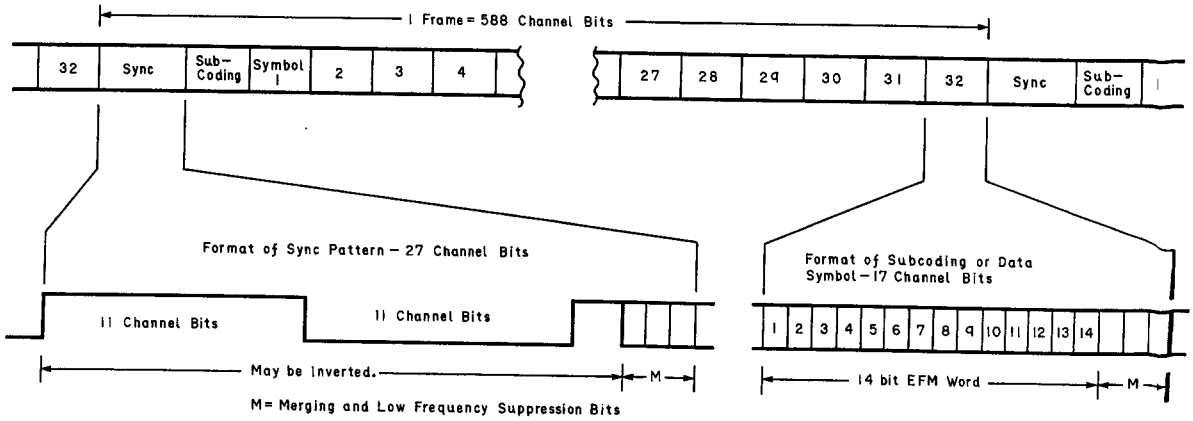


Fig. 8.1.15 Input Waveform to HF Pin (SAA7011)

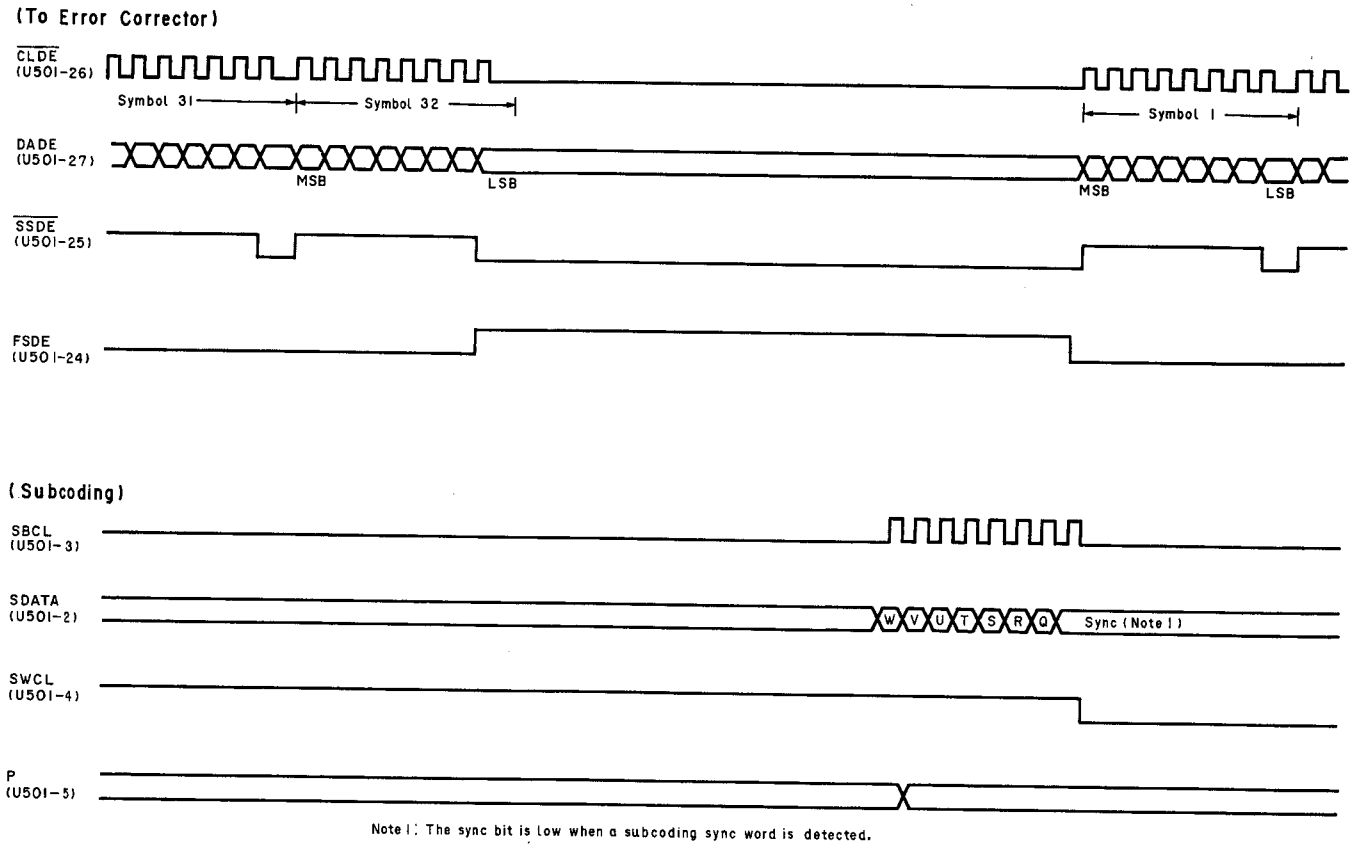


Fig. 8.1.16 Output Waveforms (SAA7011)

Description of Error Corrector IC U504 (SAA7020)
(See Figs. 8.1.17 and 8.1.18.)

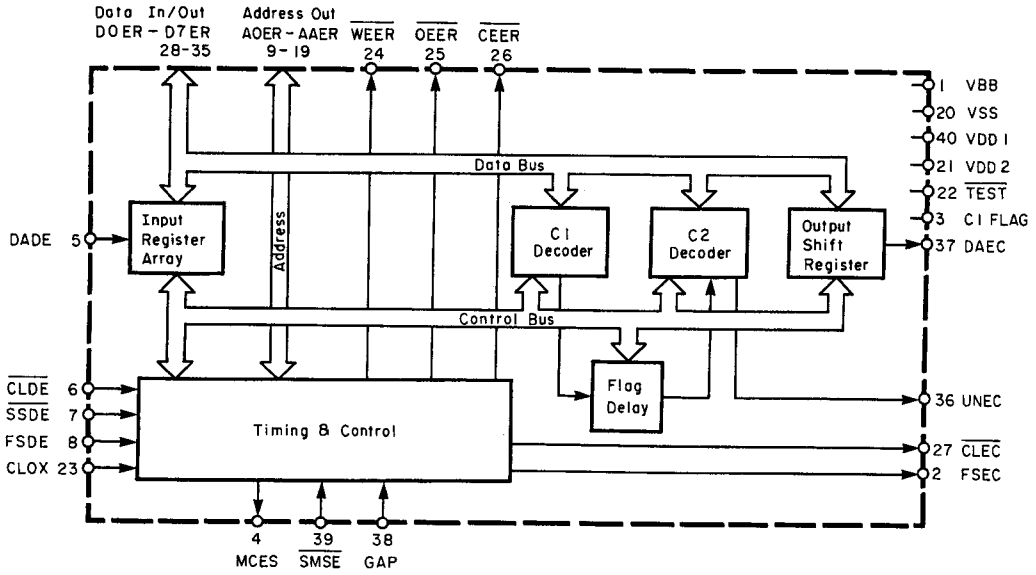


Fig. 8.1.17 Error Corrector IC SAA7020

Pin Descripiton of Error Corrector IC:

Pin No.	Signal Name	In/ Out	Description
1	VBB	In	This pin will be connected externally to a −2.5 V supply for back bias.
2	FSEC	Out	Output data clock, data is valid on the falling edge. See Fig. 8.1.18.
3	C1 Flag	Out	This pin is not connected for normal operation, it is for testing purposes. Indicating Flags in the C1 Flag store and hence showing the positions of multiple errors.
4	MCES	Out	This is an open drain output providing a pulse-width modulated signal to control the rate of data entry. If the data rate has been correct for a period, MCES will have a 50% duty cycle. If MCES is mostly high data is entering too slowly and if MCES is mostly low data is entering too quickly.
5	DADE	In	This pin taken in the data for processing from SAA7011 (Demodulator IC). Data is clocked in by $\overline{\text{CLDE}}$ in 8 bit symbols, MSB first. See Fig. 8.1.18.
6	$\overline{\text{CLDE}}$	In	This is the clock for the data input. Data is accepted into DADE on the negative edge of $\overline{\text{CLDE}}$.
7	$\overline{\text{SSDE}}$	In	This signal is the output from SAA7011. This signal indicates the last bit of each 8 bit symbol. If it is low during the negative transition of $\overline{\text{CLDE}}$ a symbol is counted and clocked in, therefore $\overline{\text{SSDE}}$ must remain low for only one negative transition in eight for correct operation.
8	FSDE	In	This signal is the output from SAA7011. A high on this pin during the negative transition of $\overline{\text{CLDE}}$ indicates the end of a frame of data. The minimum duration of FSDE is critical at high rates of data input, to ensure no FSDE pulses are missed causing erroneous speed indications of MCES.
9-19	A0ER-AAER	Out	Eleven address outputs to 2KB RAM. Provided data is being received by DADE, $\overline{\text{CLDE}}$ etc., then address A0ER to AAER are completely exercised every four frames enabling refresh to be automatic for pseudo-static RAMs.
20	VSS	—	Ground supply for SAA7020.
21	VDD2	In	Nominal 12 V supply.
22	$\overline{\text{TEST}}$	In	This pin should be connected directly to VDD1 or VDD2 for normal operation.
23	CLOX	In	This is the basic clock input for the SAA7020. A nominal frequency of 4.2336 MHz is fed in from the SAA7000.
24	$\overline{\text{WEER}}$	Out	Write enable bar for control of the memory, when low SAA7020 is writing to the RAM.
25	$\overline{\text{OEER}}$	Out	Output enable bar for control of the memory output buffers, when low the memory outputs must be tri-stated.
26	$\overline{\text{CEER}}$	Out	Chip enable bar for use with pseudo-static memories. (This pin is open.)
27	$\overline{\text{CLEC}}$	Out	Output data clock, data is valid on the falling edge. See Fig. 8.1.18.
28-35	D0ER-D7ER	In/ Out	An 8 bit parallel data bus between SAA7020 and the RAM. The outputs are high impedance state when $\overline{\text{OEER}}$ is low.
36	UNEC	Out	Unreliable data flag, when high indicates that output data is unreliable. During active data output (i.e., when CLEC is operating) UNEC applies to each symbol of 8 bits of data output at that time. Before each data word of two symbols is output, UNEC applies to the whole data word that will follow in five frames time.
37	DAEC	Out	Data output to SAA7000. Data is output in 16 bit words separated by gaps. Each word is in two's complement format with MSB first and is made up of 2x8 bit symbols. Between the data words the state of the GAP pin is output. Data is valid on the falling edge of $\overline{\text{CLEC}}$. See Fig. 8.1.18.
38	GAP	In	The state of this pin is reflected in the state of the data output between words on DAEC. It is used to pass information with the data words. A high on GAP making the GAP level on DAEC high and vice versa. See Fig. 8.1.18.
39	$\overline{\text{SMSE}}$	In	If $\overline{\text{SMSE}}$ is held low the UNEC output will be held high. This input is used to cause SAA7000 to mute the data.
40	VDD1	In	Nominal 5 V supply.

General Description of Error Corrector IC:

The SAA7020 Error Corrector IC is for the detection and correction of erroneous data samples in the compact disc digital autio decoding system. Receiving demodulated data and timing signals from the SAA7011 Demodulator IC SAA7020 sends data samples, corrected if necessary and possible, and timing signals to the SAA7000 Concealment of Errors by Interpolation and Muting IC. If it is not possible for SAA7020 to correct the erroneous data then the unchanged data and an Error Flag is sent to the SAA7000. SAA7020 Error Corrector IC also supplies the motor speed control signal.

SAA7020 receives serial data from the SAA7011 (Demodulator) at the demodulator clock rate through the input DADE into the "Pre-Fifo" where it is converted to an 8 bit parallel format and then clocked out through the Fifo-to-RAM section at the system crystal clock rate to a 2K x 8 bit RAM via I/O ports D0ER to D7ER.

The "Pre-Fifo" is also an effective "de-jitter" circuit eliminating effects such as "wow" and "flutter" and can cope with deviations from the nominal data rate of plus and minus 2-1/4 frames of data. From the difference between the nominal data rate and the actual data rate the motorspeed control signal MCES is derived. This forms a feed back loop with the motor to control the disc speed and hence the rate data is read into the "Pre-Fifo".
The RAM is used as a temporary data store from which the data, stored in the form of a "Reed Solomon" code, is de-interleaved and read back into SAA7020 via the I/O ports into the syndrome generation and locator section. The syndromes formed are multiplied around to check for erroneous symbols. If one error is detected the error is corrected and the data symbols are written back to the RAM with some parity symbols being discarded. If more than one error is detected the data is read back to the RAM unchanged but an internal C1 flag is set to mark these symbols as unreliable.

The data in the RAM is then de-interleaved and read back into SAA7020 for a second time. The symbols are then checked for errors as previously. If one error is detected it is corrected and the symbols read back to the RAM as previously. If two errors are detected the information from the syndrome generator multiplication plus the positional data in the Flag store obtained in the C1 attempt at correction is used to correct both symbols. This is done by selecting stored data in the ROM and multiplying it with the data in the C2 stack. The corrected data is then read back to the RAM. If more than two symbols are in error the data is read back to the RAM unchanged but a flag is set to mark these symbols as unreliable. At this stage the remaining parity bits are discarded.

The data is then held in the RAM to give a five frame delay so that the advanced error flag can be sent to the SAA7000 to warn it to mute the relevant data, this flag is sent via the UNEC Output Pin. The UNEC Output Pin also warns of data to be interpolated and to mute if the $\overline{\text{SMSE}}$ Input Pin is active, i.e., as between tracks. The data is then read back into SAA7020 in parallel and serially shifted out through the DAEC Output Pin to the SAA7000.

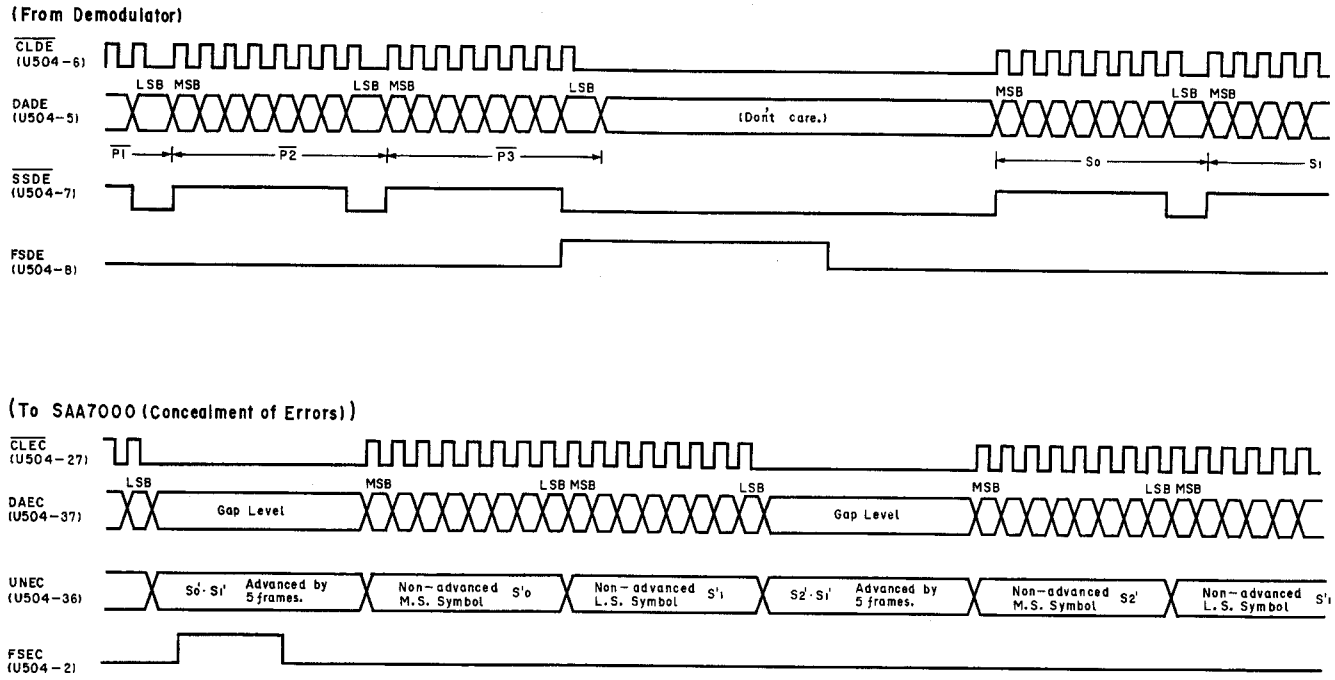


Fig. 8.1.18 Typical Input/Output Waveforms (SAA7020)

Description of Concealment of Error IC U506 (SAA7000)
(See Figs. 8.1.19 and 8.1.20.)

Pin Description of Concealment of Error IC:

Pin No.	Signal Name	In/ Out	Description
1	VBB	In	This pin is used for the supply of an external VBB of −2.5 V.
2	FSEC	In	FSEC is an active high pulse which indicates the start of a "Frame". It is used to synchronize the descramblers to the data frames (12 samples) and also SAA7000 clocks to the $\overline{\text{CLEC}}$ input clock, aligning the gap in the internal clock to the FSEC pulse. Two consecutive FSEC pulses must occur, each having a pulse width of approximately 6 CLOX cycles. The trailing edge of the second pulse must occur one frame later than the trailing edge of the first pulse, for a re-synchronization to occur.
3	$\overline{\text{CLEC}}$	In	$\overline{\text{CLEC}}$ is the input clock, having a clocking period of 2 x CLOX period, used for loading data from SAA7020. On the negative edge, data at $\overline{\text{DAEC}}$ is shifted in to the input shift register. $\overline{\text{CLEC}}$ clocks a data sample in, then stays low for a gap of 16 CLOX cycles (see Fig. 8.1.20).
4	DAEC	In	DAEC is the data input in 2's complement form with MSB leading. During the gap in $\overline{\text{CLEC}}$ the DAEC input is used to select the output format, a high selects 2's complement, a low offset binary (see Fig. 8.1.20). Note: the data is descrambled internally so the input sample format is complex.
5	UNEC	In	UNEC is the error flag input. During the period when $\overline{\text{CLEC}}$ clocks in the DAEC input, UNEC is low only if the present symbol (8 bits see Fig. 8.1.20) is valid. During the $\overline{\text{CLEC}}$ gap before a word UNEC is low only if the whole of the data word due to arrive 5 frames later is valid.
6	CLOX	Out	CLOX is a buffered form of the clock on XTAL1.
7	XTAL2	Out	XTAL2 is the output drive to a crystal to provide the main clock.
8	XTAL1	In	XTAL1 is the input pin for crystal circuit.
9	VSS	—	Ground supply pin.
10	VDD2	In	Nominal 12 V supply pin.
11	STR2	Out	STR2 is an active high strobe pulse of 2 CLOX cycles duration occurring every 24 CLOX cycles. (This pin is not used.)
12	STR1	Out	STR1 is an active high strobe pulse of 2 CLOX cycles duration, occurring every 96 CLOX cycles, after each pair of data words have been output. It is used to strobe data to SAA7030 (Digital Filter IC). Both STR1 and STR2 are re-synchronized to XTAL1 to obtain minimum jitter.
13	DLCF	Out	DLCF outputs data for the left channel in either 2's complement or offset binary format, selected by DAEC.
14	$\overline{\text{CLCF}}$	Out	$\overline{\text{CLCF}}$ is either a 14 bit or 16 bit output clock, selected by pin 16 (14/$\overline{16}$). It is used to clock data from DLCF/DRCF to SAA7030 on its negative edge. (i.e., DLCF/DRCF stable during falling edge, see Fig. 8.1.20.)
15	DRCF	Out	DRCF outputs data for the right channel in either 2's complement or offset binary format, selected by DAEC.
16	14/$\overline{16}$	In	14/$\overline{16}$ selects the bit length of the output clock $\overline{\text{CLCF}}$.
17	TEST	In	This pin selects between normal and test modes. For normal operation it should be held at 0 V.
18	VDD1	In	Nominal 5 V supply pin.

General Description of Concealment of Error IC:

The SAA7000 (Concealment of Errors by Interpolation and Muting IC) is used in the compact disc system to reduce audible annoyance caused by uncorrected erroneous data samples from the SAA7020 (Error Corrector IC).

Data samples (at DAEC clocked in with $\overline{CLEC}$) are first descrambled and then separated into left and right samples. A similar descramble and separation is performed on the Error Flag (UNEC). Where no error flags occur the data value is unaffected through SAA7000.

If for either left or right a single "error" is flagged between two "good" samples then linear interpolation is used to replace the erroneous value. If two or more adjacent samples are flagged then the samples in error will be muted. Beginning thirty samples before the first of the consecutive errors, the value of the samples will be attenuated smoothly to zero level, using a $(0 - \pi)$ cosine shape curve. After the error burst the next thirty samples are attenuated smoothly to full level, using a $(\pi - 2\pi)$ cosine shaped curve. This muting/attenuation occurs to data of left and right channels simultaneously regardless of the source of the mute.

The data (good or processed) is then formatted into 2's complement or offset binary to match the D/A Converters used. This selection is made with a special function of the data input (DAEC). Data is then fed to the left and right outputs (DLCF and DRCF) and is clocked out by the Output Clock ($\overline{CLCF}$). Strobes (STR1 and STR2) are generated for the SAA7030 (Digital Filter IC). Fourteen or sixteen bit D/A Converters can be accomodated by use of the Select Input ($14/\overline{16}$).

A 2x bit rate clock (CLOX) is fed to the system (SAA7020 (Error Corrector IC) and SAA7030 (Digital Filter IC)), SAA7000 automatically synchronizes to the SAA7020 output using the frame sync (FSEC) pulse for internal timing reset.

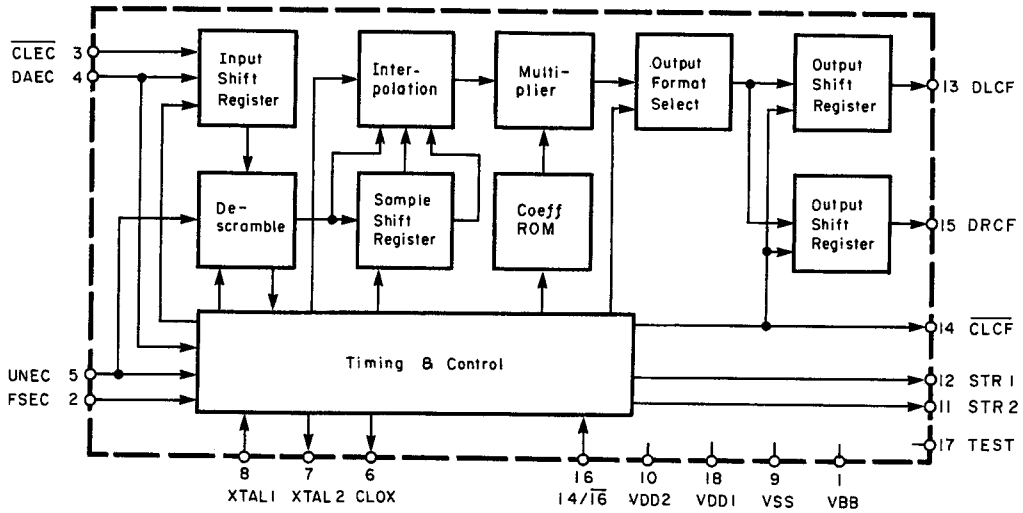


Fig. 8.1.19 Concealment of Error IC SAA7000

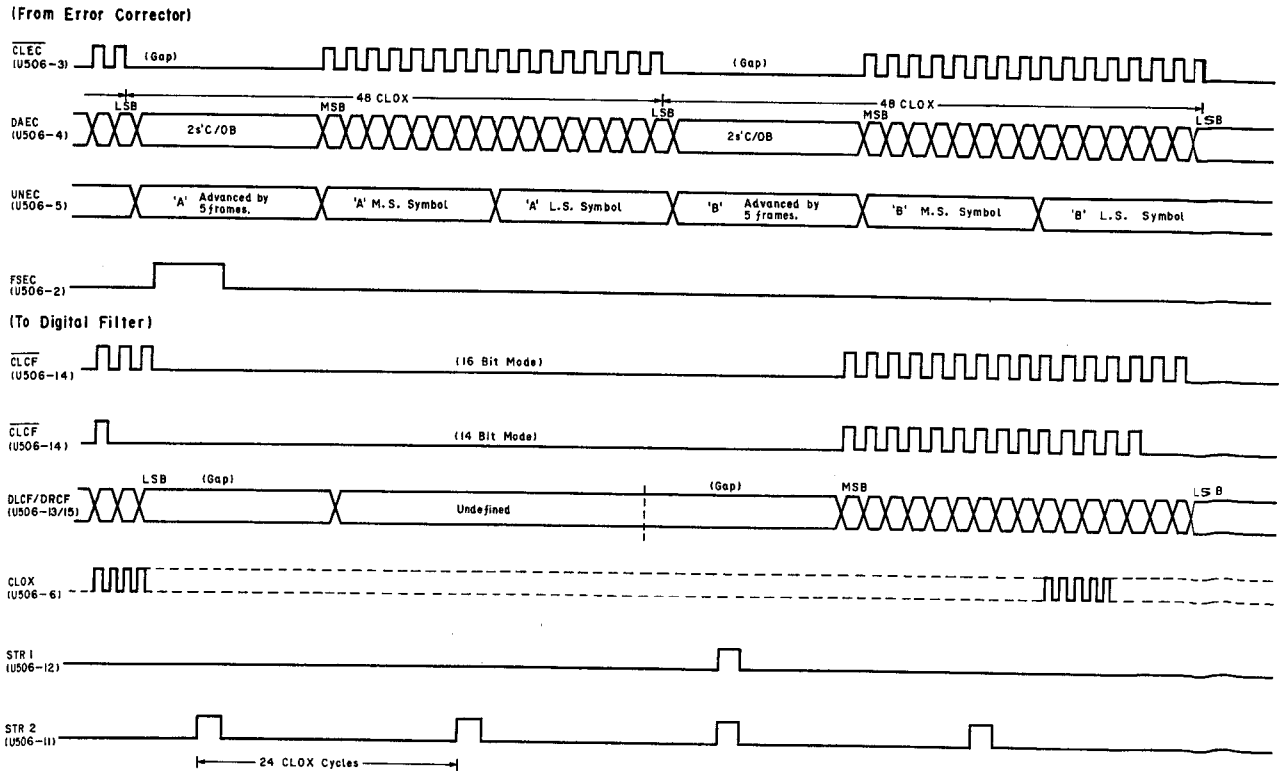


Fig. 8.1.20 Input/Output Waveforms (SAA7000)

Description of Digital Filter IC U507 (SAA7030)
(See Figs. 8.1.21 and 8.1.22.)

Pin Description of Digital Filter IC:

Pin No.	Signal Name	In/ Out	Description
1	VBB	In	−2.5 V ±0.5 V supply.
2	OS	In	Offset select input. When connected to VDD1 the data output has a fixed DC offset of 3%. When connected to VSS the output has no offset. (This pin is connected to VDD1.)
3	DLFD	Out	Left channel data output. The data is 14 bit serial, MSB first and is valid on the falling edge of output clock $\overline{CLFD}$.
6	$\overline{CLFD}$	Out	Output data clock, nominal frequency 4.2336 MHz (= CLOX). The falling edge of this signal defines output data valid.
7	LAT	Out	Output 176.4 kHz strobe. The rising edge of this pulse says that the output of a 14 bit data word has been completed.
10	DRFD	Out	Right channel data output. See DLFD.
11	$\overline{OB}$	In	Offset binary not input. When connected to VDD1 the output data is coded as 2's complement. When connected to VSS the output data is coded as offset binary. (This pin is connected to VSS.)
12	VSS	—	Ground.
13	VDD2	In	12 V ±10% supply.
15	TINR	In	Test input (R). Right channel test chain input. In normal operation this pin should be connected to either VSS or VDD1.
16	TINL	In	Test input (L). Left channel test chain input. See TINR.
17	DRCF	In	Right channel data input. Data should be 16 bit serial, MSB first, offset binary coded. It should be valid on the falling edge of the data clock $\overline{CLCF}$.
18	$\overline{CLCF}$	In	Input data clock. The falling edge of this signal defines input data valid.
19	CLOX	In	Master input clock. Runs continuously at a nominal frequency of 4.2336 MHz.
20	DLCF	In	Left channel data input. See DRCF.
21	STR1	In	Input 44.1 kHz strobe. The circuit's internal timing chain is synchronized by the rising edge of STR1 which must run synchronously with CLOX in accordance with the timings specified in the electrical characteristics. The rising edge should follow the completion of the input data stream.
22	$\overline{RT}$	In	Reset test not input. When low resets the part of the accumulator not reset in normal operation to initialize the accumulator for testing. In normal operation should be connected to VDD1.
23	$\overline{TE}$	In	Test enable not input. When low switches the internal circuitry into the sequential scan test mode. In normal operation should be connected to VDD1.
24	VDD1	In	5 V ±10% supply.

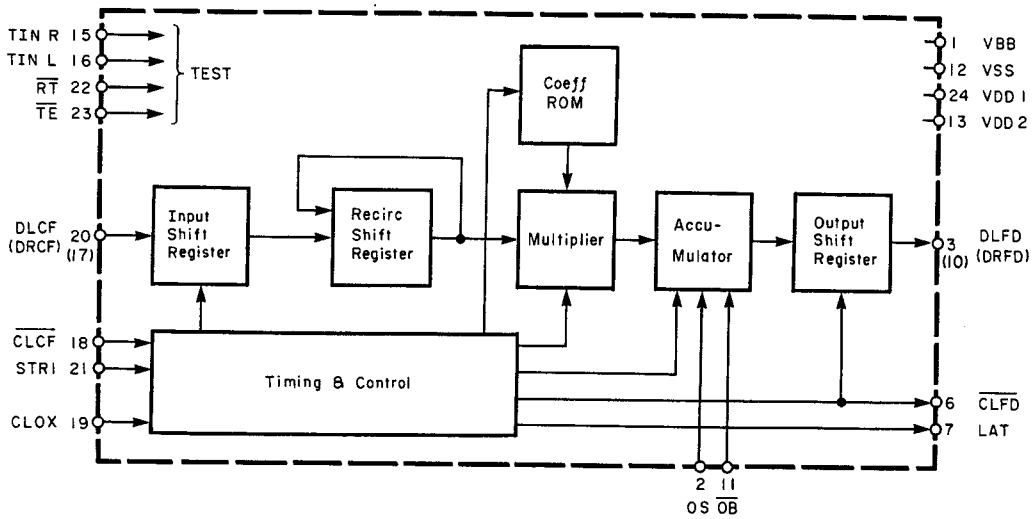


Fig. 8.1.21 Digital Filter IC SAA7030

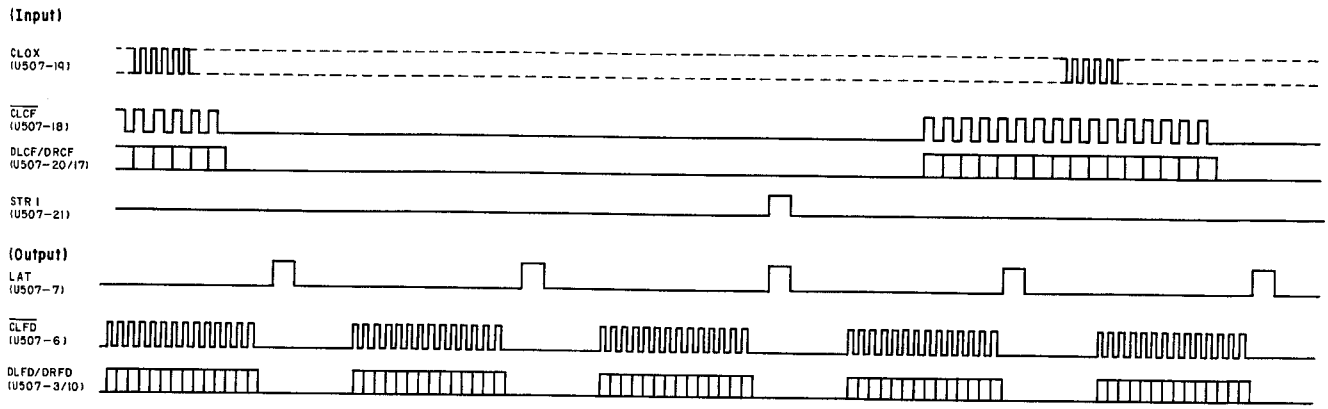


Fig. 8.1.22 Input/Output Waveform (SAA7030)

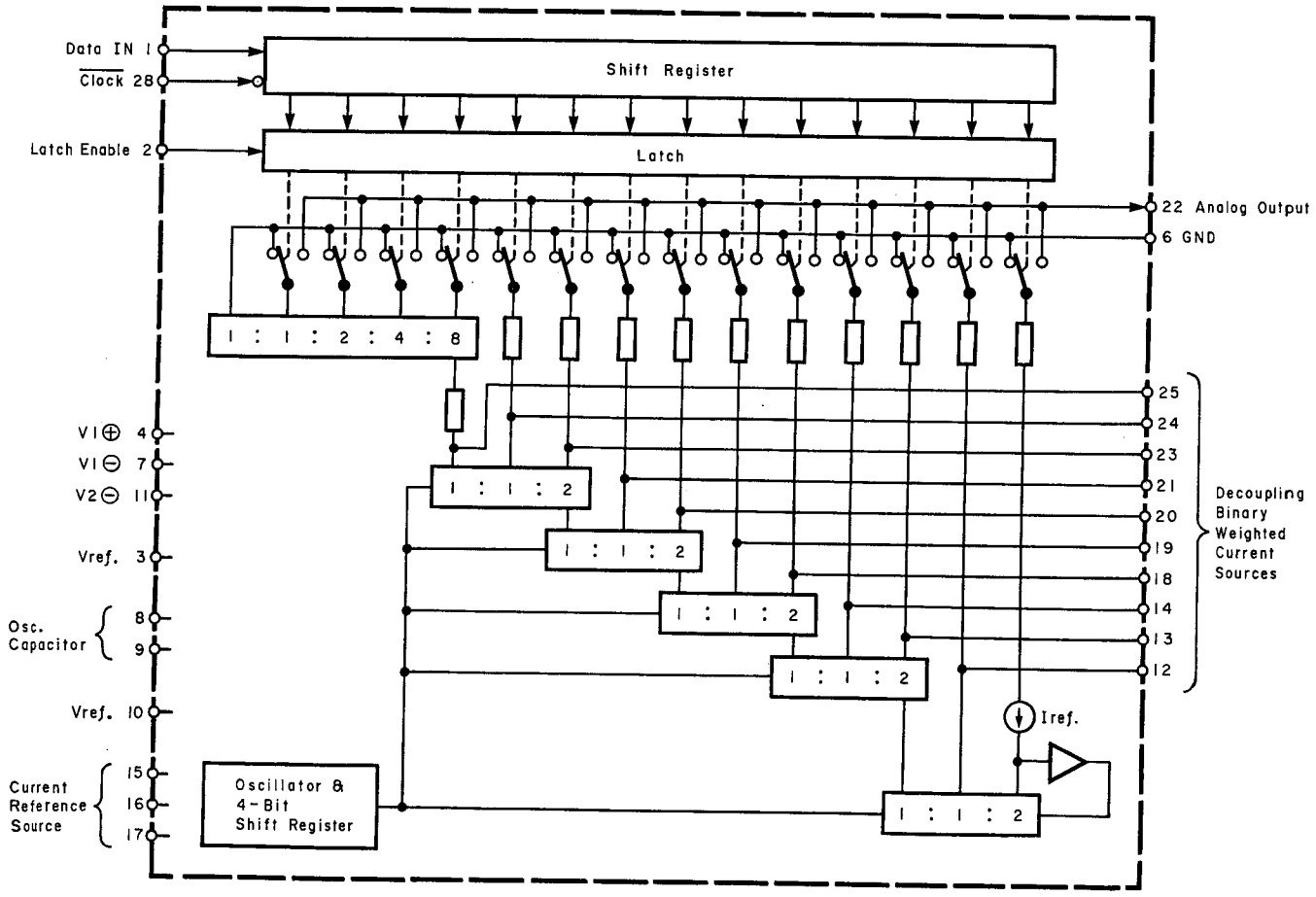


Fig. 8.1.22 D/A Converter IC TDA1540D

8.2. Waveforms at Major Points

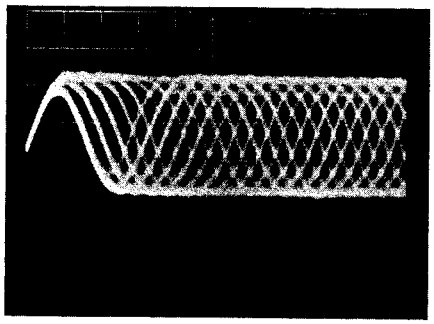


Fig. 8.2.1 EFM Signal at TP1 on Main P.C.B. Ass'y

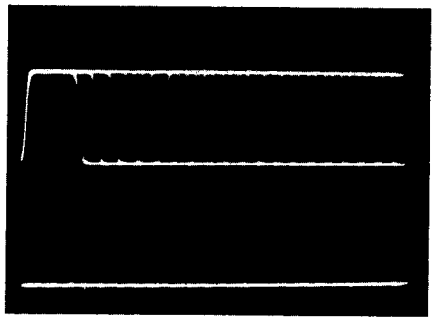


Fig. 8.2.2 Waveforms at emitter of Q104 (above) and TP2 (below) on Main P.C.B. Ass'y

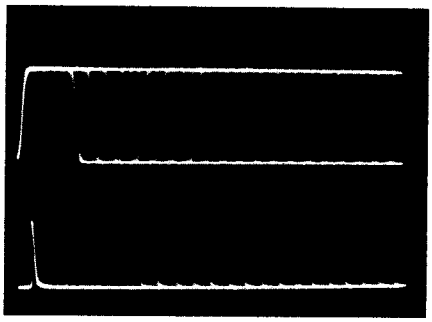


Fig. 8.2.3 Waveforms at emitter of Q104 (above) and TP3 (below) on Main P.C.B. Ass'y

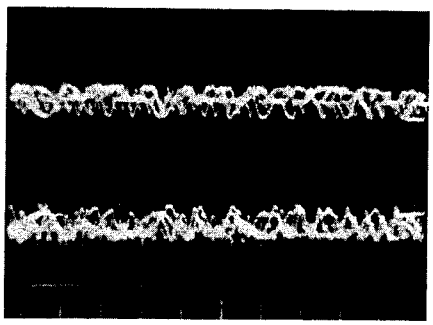


Fig. 8.2.4 Waveforms at TP4/TP5 on Main P.C.B. Ass'y

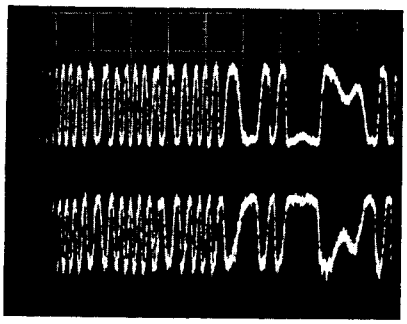


Fig. 8.2.5 Waveforms at TP4/TP5 on Main P.C.B. Ass'y (when RV107 is set to zero)

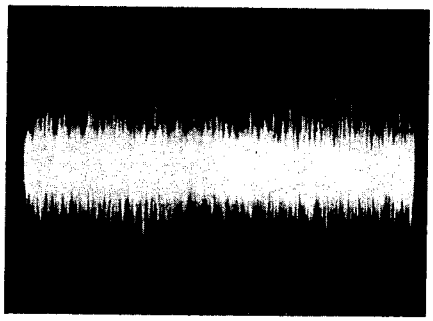


Fig. 8.2.6 Focus Servo Signal at TP7 on Main P.C.B. Ass'y

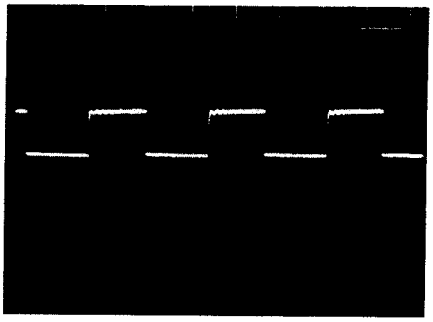


Fig. 8.2.7 MCES Signal at TP9 on Main P.C.B. Ass'y

Warning:

Parts marked with the symbol ⚠ have critical characteristics.

Use ONLY replacement parts recommended by the manufacturer. It is recommended that the unit be operated from a suitable DC supply or batteries during initial check-out procedure.

Caution:

Before returning the unit to the customer, make sure you make either (1) a leakage current check or (2) a line to chassis resistance check. If the leakage current exceeds 0.5 milliamp, or if the resistance from chassis to either side of the power cord is less than 240 k ohms, the unit is defective. WARNING — DO NOT return the unit to the customer until the problem is located and corrected.

8.3. Schematic Diagram

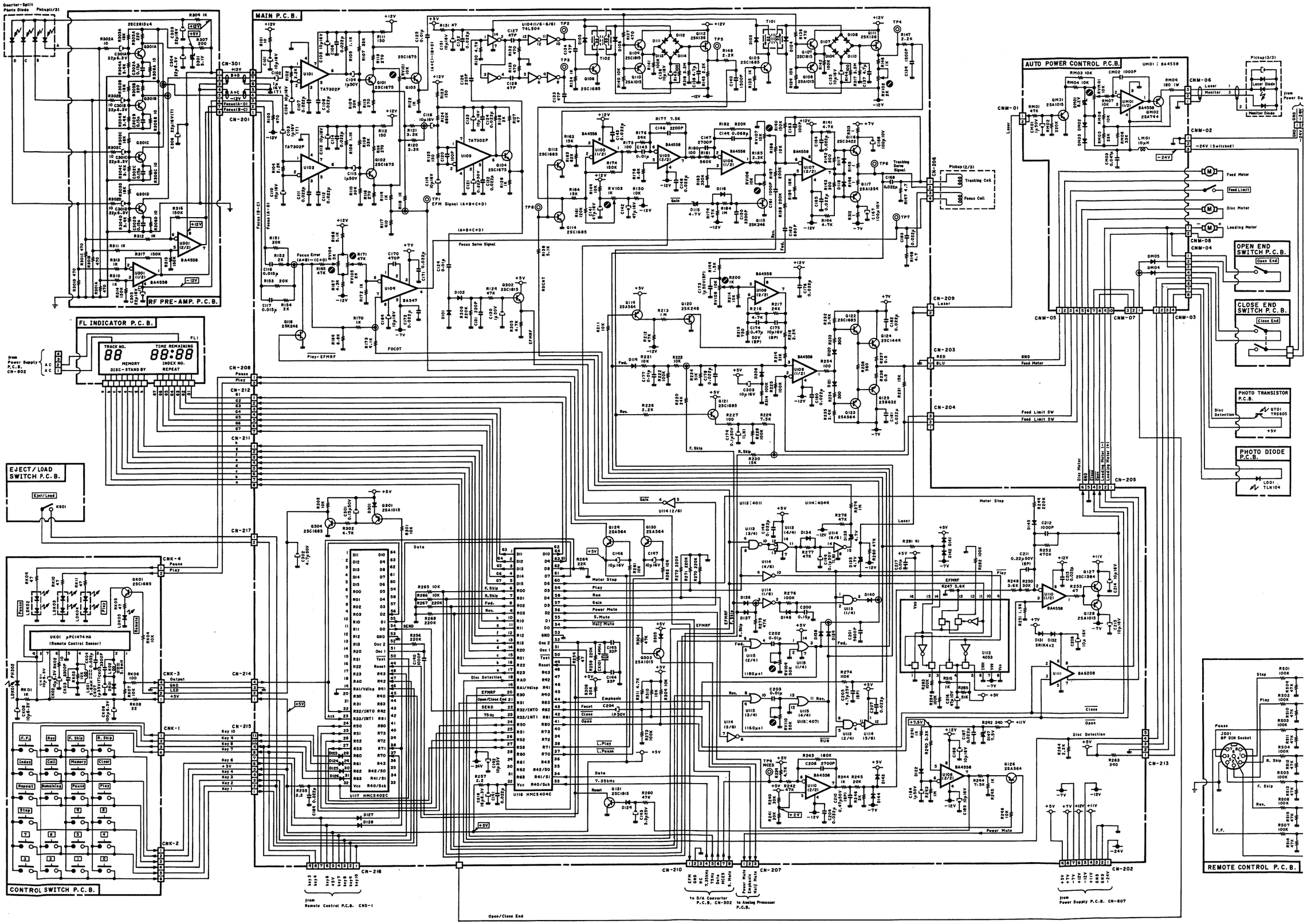
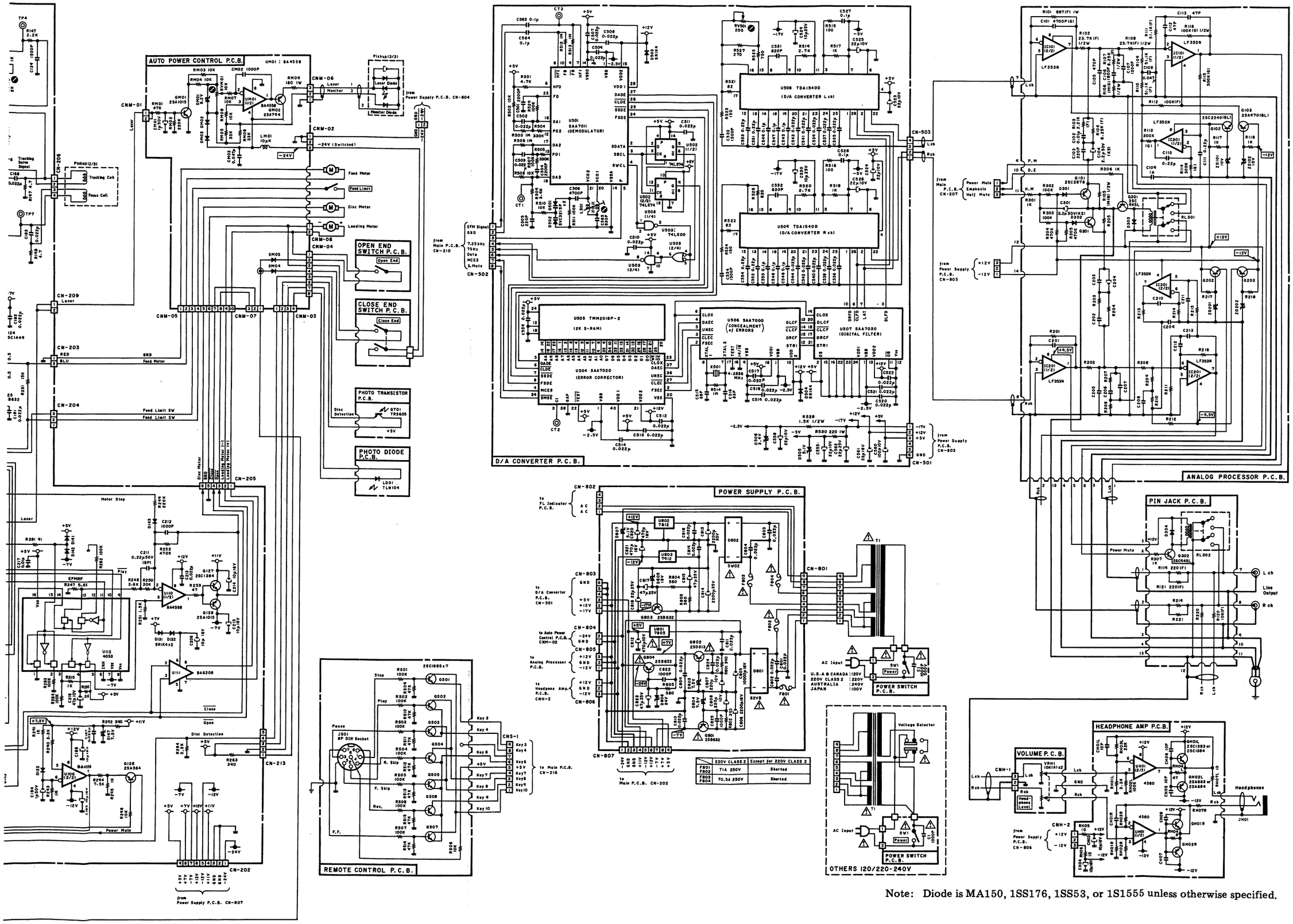


Fig. 8.3

V01620 / Druck 5



Note: Diode is MA150, 1SS176, 1SS53, or 1S1555 unless otherwise specified.

Fig. 8.3

9. WIRING DIAGRAM

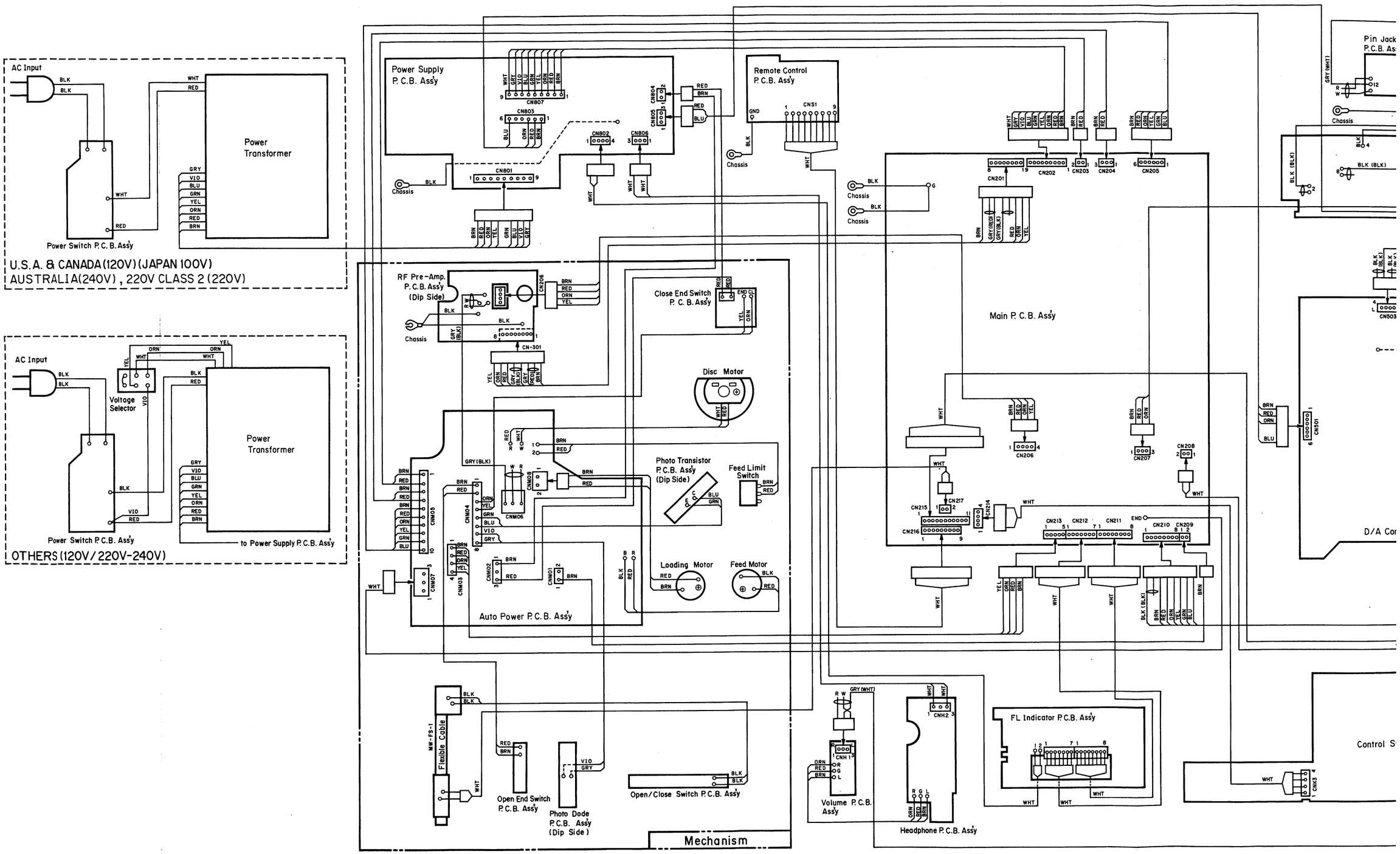
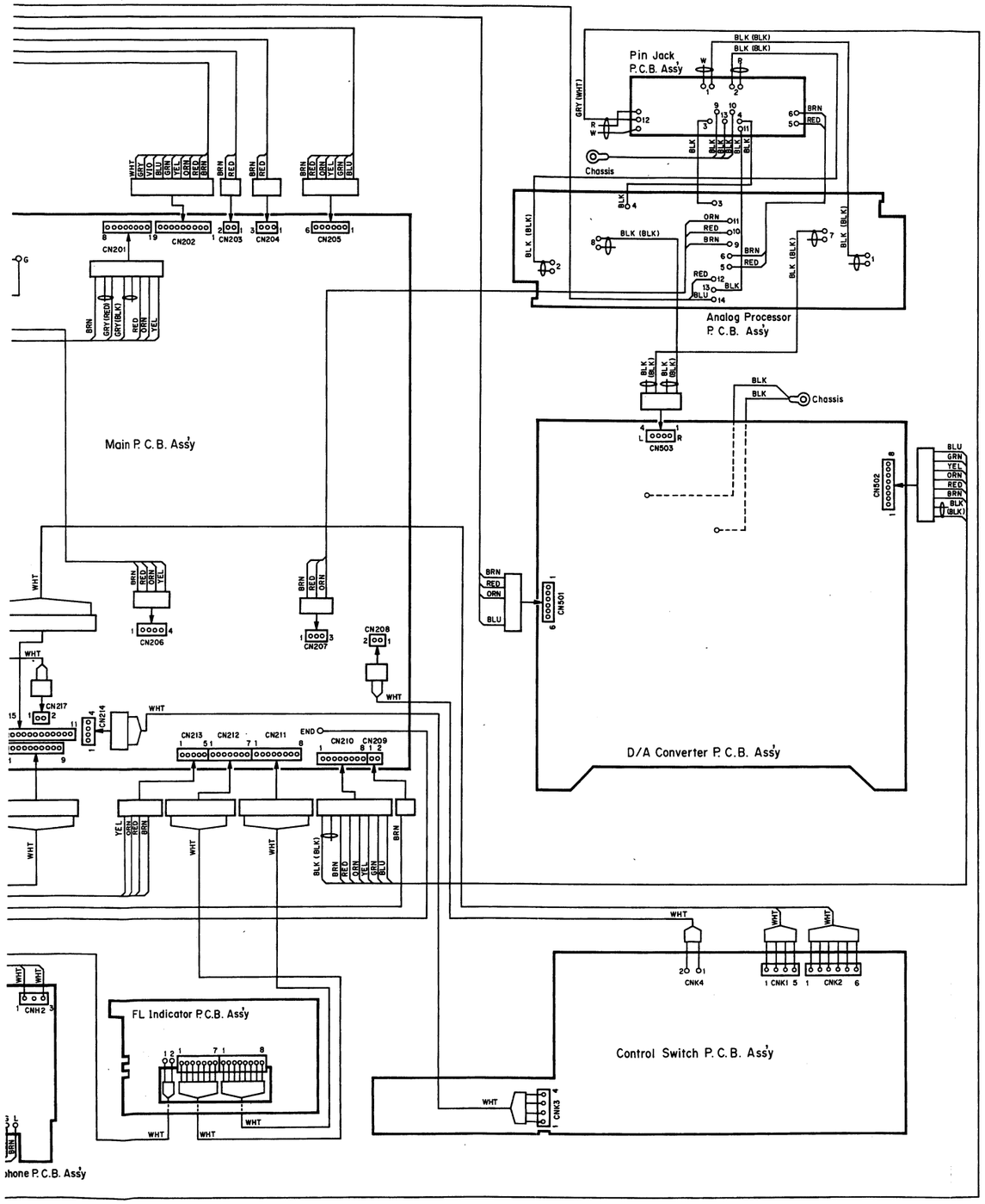


Fig. 9

10. BLOCK DIAGRAM



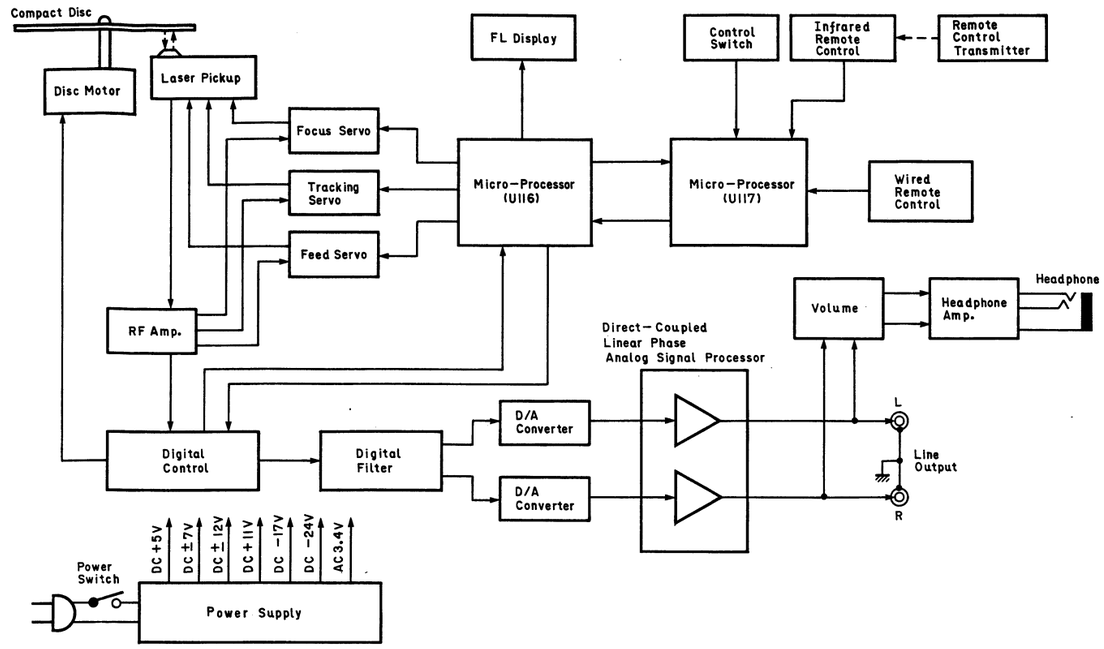


Fig. 10

Notes: 1 Table of wire colors

BRN — Brown	BLU — Blue
RED — Red	VIO — Violet
ORN — Orange	GRY — Gray
YEL — Yellow	WHT — White
GRN — Green	BLK — Black

2. Component side view of the P.C.B. is illustrated unless otherwise specified.
3. Wire tube color is shown in ( ).

11. REMOTE CONTROL TRANSMITTER UNIT RM-7

11.1. Mechanism Ass'y and Parts List

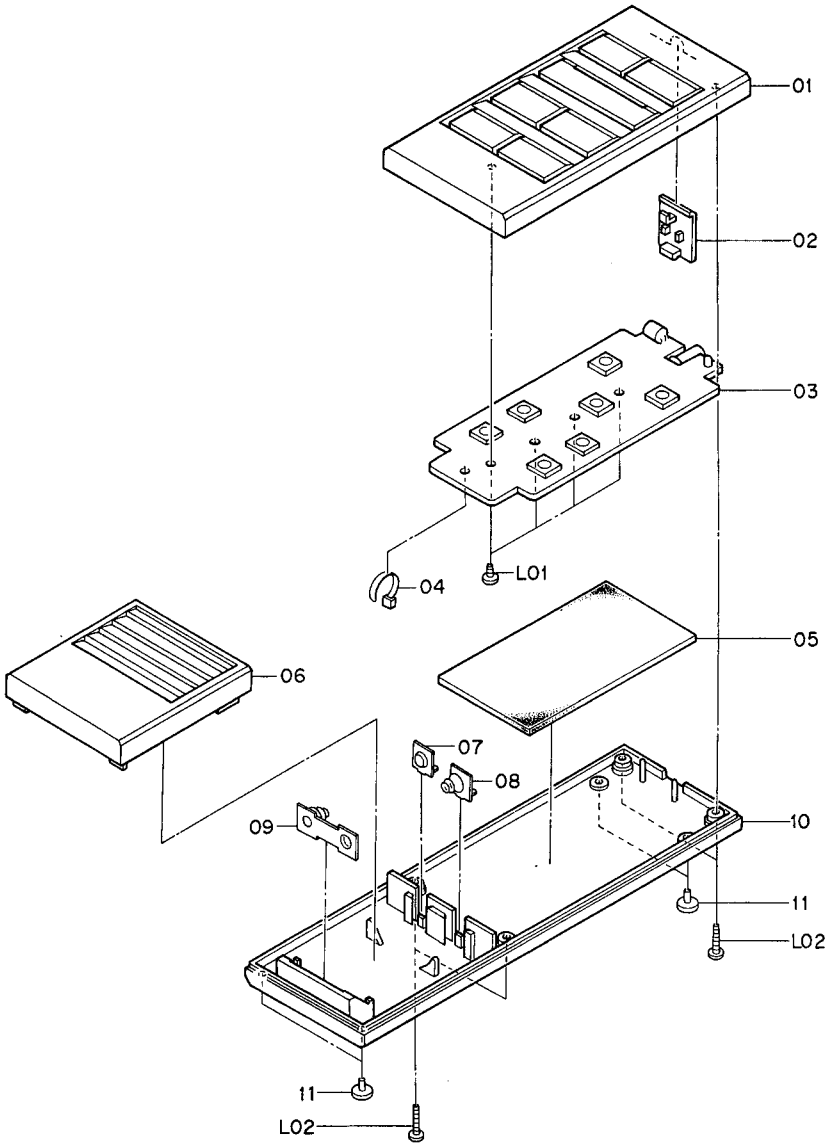


Fig. 11.1

Schematic Ref. No.	Part No.	Description	Q'ty
		Remote Control Transmitter Unit RM-7	
01	0H04500A	Upper Case A	1
02	0H04499B	Lens	1
03	BA05439A	Remote Control Transmitter P.C.B. Ass'y	1
04	0B08515A	Insu-Lock	1
05	0J04884A	Rubber Plate	1
06	0H04498A	Upper Case B	1
07	0J04875A	Terminal Plate A	1
08	0J04876A	Terminal Plate B	1
09	0J04877A	Terminal Plate C	1
10	0H04497B	Bottom Case	1
11	0H03920A	Leg	4
L01	0E00941A	BT 3x5 ⊕ Binding (Black Chromate)	4
L02	0E00948A	BT 3x10 ⊕ Binding (Black Chromate)	4

11.2. Mounting Diagram and Parts List

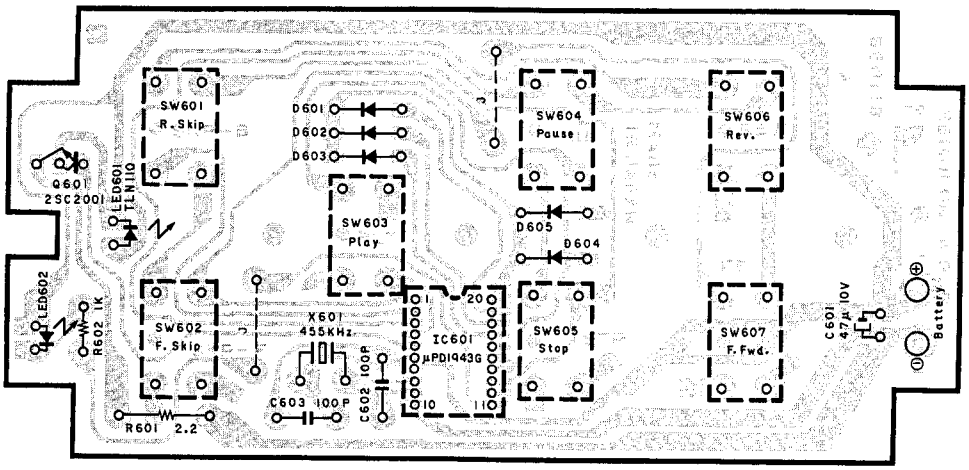


Fig. 11.2

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	BA05439A	Remote Control Transmitter P.C.B. Ass'y	LED602	0B12218A	LED TLG226 Green
			D601-605	0B06181A	SiD 1SS53
			X601	0B92001A	Crystal 455kHz
			R601	0B09925A	RK 2.2 1/4W J
	0B60118A	Remote Control Transmitter P.C.B.	R602	0B09677A	RK 1K 1/6W J
IC601	0B11065A	IC μPD1943G	C601	0B01836A	CE 47μ 10V
Q601	0B10049A	TR 2SC2001 (K)	C602,603	0B41079A	CC 100P 100V J
LED601	0B12224A	Infrared Diode TLN110	SW601-607	0B07354A	Push Switch
				0B90021A	Band EG-9 (1)

11.3. Schematic Diagram

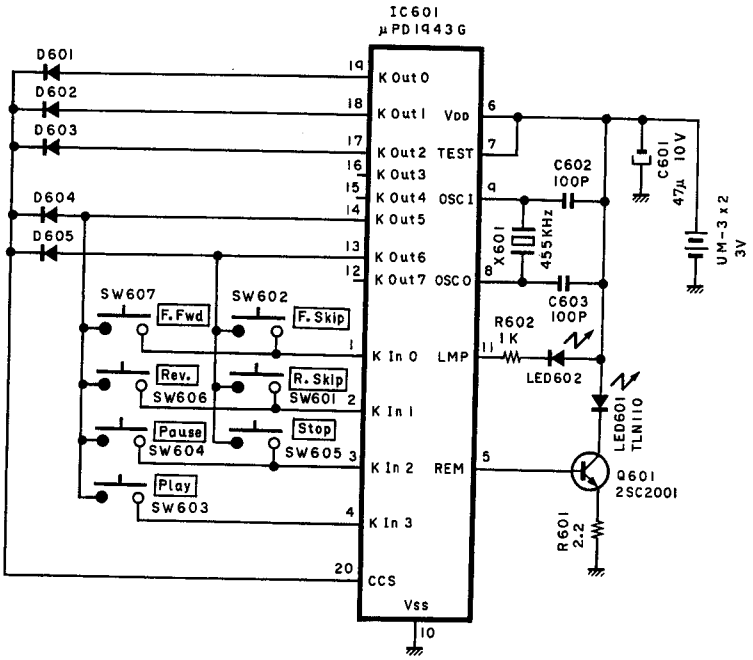


Fig. 11.3

12. SPECIFICATIONS

Main Unit

System	Compact disc digital audio
Signal Detection	Contactless optical system (with semiconductor laser element)
Error Correction	CIRC system
Number of Channels	2 channels, stereo
Sampling Frequency	44.1 kHz
Quantization	16-bit linear
Disc Rotational Velocity	Approx. 200 to 500 rpm (constant linear velocity)
Wow & Flutter	Unmeasurable
Frequency Response	5—20,000 Hz ±0.5 dB
Signal to Noise Ratio	Better than 92 dB (IHF A-WTD)
Total Harmonic Distortion	0.003% (1 kHz)
Channel Separation	Better than 92 dB
Output (Line)	2 V (1 kHz, 0 dB) 100 ohms
(Headphones)	20 mW (1 kHz, 0 dB, output level control at max.) 8 ohms
Power Source	100, 120, 120/220-240, 220 or 240 V AC; 50/60 Hz (According to country of sale)
Power Consumption	33 W max.
Dimensions	435 (W) x 100 (H) x 308 (D) mm 17-1/8 (W) x 3-15/16 (H) x 12-1/8 (D) inches
Approximate Weight	7.5 kg 16 lb. 9 oz.

Remote Control Transmitter Unit RM-7

System	Infrared pulse system
Power Supply	DC 3 V (1.5 V x 2)
Dimensions	57 (W) x 175 (H) x 19 (D) mm 2-1/4 (W) x 6-7/8 (H) x 3/4 (D) inches
Approximate Weight	140 g 5 oz.

- Specifications and design are subject to change for further improvement without notice.

Service Manual

Nakamichi OMS-7,OMS-7E,OMS-70

Nakamichi Corporation/Tokyo Office — Shinjuku Daiichi Seimei Bldg., 2-7-1 Nishishinjuku, Shinjuku-ku, Tokyo 163 Phone: (03) 3342-4461 Telex: 2324721 (NAKAM J)
Nakamichi America Corporation — 19701 South Vermont Ave., Torrance, CA 90502 Phone: (213) 538-8150
Nakamichi Canada — 276 South West, Marine Drive, Vancouver, B.C. V5X 2R4 Phone: (604) 324-7535
Nakamichi Australia — Level 2, 61A Dunning Ave., Rosebery, N.S.W. 2018 Phone: (02) 313-7071/7090
Nakamichi GmbH — Praunheimer Landstraße 32, 6000 Frankfurt Main 90 Phone: (069) 768-2021 (Office), 2025 (Service)

Printed by: Schaltungsdienst Lange, Berlin (GERMANY)

O-910601B